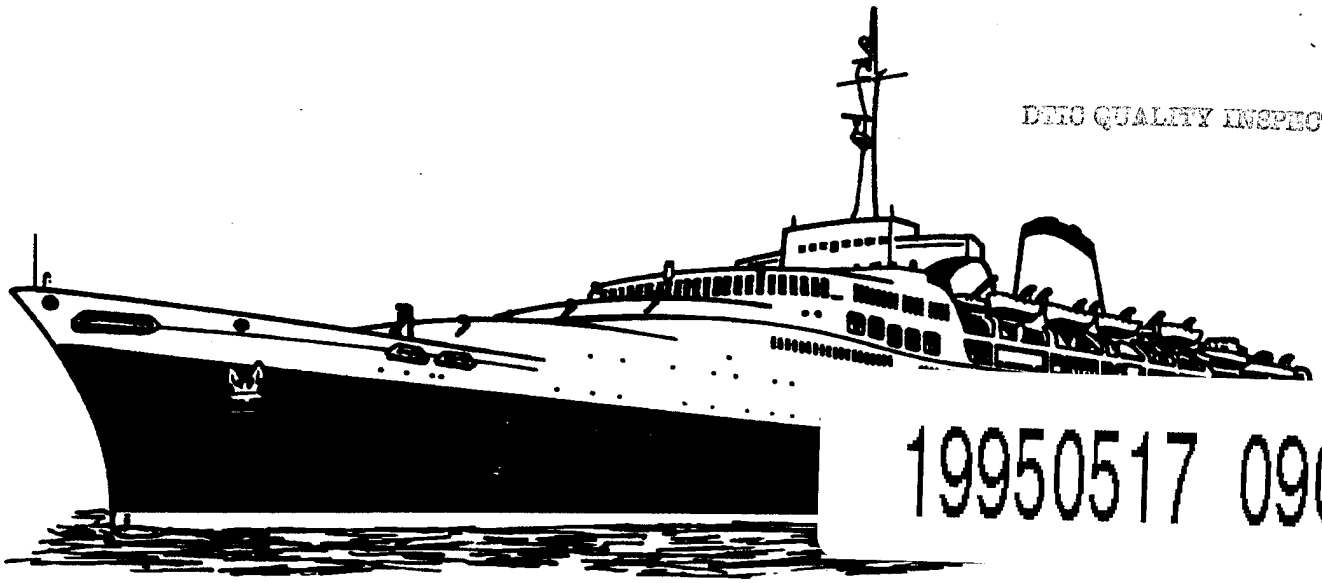
Gulf Coast Region Maritime Technology Center

Quarterly Report

95 - GCRMTC - QR01

January 1, 1995 - March 31, 1995



Gulf Coast Region
Maritime Technology Center

University of
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GCRMTC ERRATA SHEET

Please replace paragraph 6.3 in the Quarterly Report for the period 1 January - 31 March 1995 with the following new paragraph 6.3:

6.3 Sponsorship of NSRP Projects

Based on review of NSRP project, the (GCRMTC-LUO envisions a number of opportunities to use the SBD facility and other resources available at the Orange site to address areas of mutual interest. In order to use funds and infrastructure at the Orange Site effectively and efficiently, it is proposed that several NSRP projects or parts of those projects be done at the Orange Site. These NSRP projects would include previously unfunded projects as well as FY 96 proposed projects.

Table 1, "Prioritization of NSRP Projects", is a listing of unfunded and proposed NSRP projects. The column labeled "LU Component" describes the part that Lamar University can play in the proposed project. The Orange Site can serve as the sponsor, a participant, or both. In the case where LUO is a sponsor, it would provide funding for the project. Where LUO is identified as a participant means that its resources can be used by the project. Where LUO is both a participant and a sponsor, it can fund the project and use its resources to advance the project.

The column labeled "amount" is the estimated cost of the project. The source of these figures is identified in the column labeled "estimate source". These figures are recognized to be imprecise and in some cases unavailable until a proposal is submitted.

The column labeled "LU Resource" identifies the organizational resource at Lamar University which is capable of doing the work. Where the GCRMTC can serve as the funding agent, the entry is "GCRMTC sponsor". The Simulation-Based Design Center (SBD), the marketing resource center (abbreviated as "mkt res ctr"), the Instructional Technology Development Initiative (ITDI), and the John Gray Institute (JGI) are organizations at Lamar University which are either part of the GCRMTC or are parallel research entities. Where there are opportunities for any of these organizations to perform work on the identified project, then they are considered to "participate".

The second to last column is labeled "budget account". Budget account lists the source of funds under the GCRMTC-LUO budget. Where the descriptor is "Sponsored projects" the source of

funds is the pool of dollars set aside to fund projects (both in-house and subcontracted). Where the descriptor is "SBD" then these projects would come out of funds set aside for simulation-based design projects. Where the descriptor is "Mkt Ctr" then the funding source would be those set aside to be performed by the Marketing Resource Center.

The column labeled "fit" is a judgment on how closely the objectives of the proposed project match the goals and objectives of the GCRMTC-LUO. A project (or portion thereof) that does not completely match the GCRMTC's goals is labeled as a "partial" fit. Where the proposed project (or portion thereof) matches the objectives and goals of the GCRMTC-LUO, then it is identified as a "close" match.

Of the projects reviewed, the following appeared to have a close fit with the goals and objectives of the GCRMTC-LUO:

Project No.	Project Title	Estimated Cost
SP4 FY 96 proj	Production Process Simulation for Design	$ 134,000
SP4 FY 96 proj	Parametric and Modular Ship Design Development	$ 345,500
SP4 FY 96 proj	Definition and Design of Outfitting Units for Commercial Vessels	$ 274,000
SP4 FY 96 proj N9-95-3	Product Model Based Planning and Scheduling Development of Two Interactive Multimedia Training Modules	$ 164,000
SP4 FY 96 proj	Development of STEP Ship Product Model Data Set	$ 1,400,000
	Total Estimated Cost	$ 2,317,500

With the exception of Project No. N9-95-3, the topics, of research in the above list of projects are clearly related to the types of work to be undertaken under the SBD Center. It is in the best interests of the NSRP and the GCRMTC-LUO to collaborate in the development of proposals to meet the goals of these projects.

We recommend that proposals developed for these projects include to the extent practical (based on cost, benefit, and availability) the resources of the GCRMTC-LUO and the SBD Center. The proposal can define a partnership with the GCRMTC-LUO in which components of work are done by the Orange Site, by including access to the equipment and facilities at the GCRMTC-LUO, or the proposal can be written by the GCRMTC-LUO with the support of other industry, government, and academic organizations.

GULF COAST REGION MARITIME TECHNOLOGY CENTER

QUARTERLY REPORT

95-GCRMTC-QR01

Cooperative Agreement N00014-94-2-0011

REPORT PERIOD: Jan. 1, 1995 - Mar 31, 1995

SUBMITTED TO: Mr. Dale Rome
Acting Director
Shipbuilding Technology Office
Carderock Division
Naval Surface Warfare Center

SUBMITTED BY:
Gulf Coast Region Maritime Technology Center
New Orleans, LA

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The renovation of the facilities at the New Orleans Site was completed by February 15, 1995 at no cost to the project. The renovation of the Orange Site was 80% complete at the end of this reporting period. Furniture and office equipment were ordered and received for the UNO Site and the Center.

Center staff and staff from each Site attended the Ship Production Symposium & Exhibition Conference in Seattle, Washington from January 25 to January 27, 1995. The Center staff set up and operated a booth at the Exhibition. Although the booth was somewhat isolated it enhanced the visibility of the Gulf Coast Region Maritime Technology Center (GCRMTC)

The first workshop for the Center was held February 22-23, 1995 at the New Orleans Hilton Riverside Hotel. There were 69 attendees at the workshop, representing 38 maritime industries, 9 government agencies and 4 universities. Five major strategic focus areas were identified for the Center:

- Catalyzing Change within the Maritime Industry
- Integrating Design and Manufacturing
- Developing Conceptual Designs for Market Niches
- Developing Life Cycle Cost and Reliability Data Bases
- Assessing Environmental Impact of the Maritime Industry

As a further result of the workshop many potential Government/Industry Advisory Board members were identified. A number of these individuals were representative of the maritime industries as proscribed in the Cooperative Agreement and were nominated by the Executive Director to the Government Program Manager (GPM). He in turn approved the final list which is included as Appendix A.

A summary of the status of each of 11 research projects being conducted at the University of New Orleans is included in the report. Also, the status of the research "To Develop a Training Program for CBMT Trainers to Conduct the Effects of Motion Sickness", via a sub-contract with the New Orleans Site and the Naval Biodynamics Laboratory, is included in the report. The Orange Site has submitted proposals to initiate two in-house projects and is awaiting final approval at present.

The GCRMTC initiated the Shipbuilding Environmental Resource Center at the New Orleans Site and the Orange Site is planning the initiation of the Marketing Resource Center in the near future. Based on the outcomes of the February Workshop it was decided not to pursue the Standards Center at present.

The Orange Site has planned a workshop on the Simulation Based Design facility to be held at Orange, Texas in Mid-July. The Simulation Based Design facilities is scheduled for completion on April 15. Both Sites and the Center have expanded their outreach programs and have attended and given presentations at several of the shipbuilding panel meetings as well as associations such as the Machinery Association, NAVIRSA and the Advanced Technology for Large Structural Systems at Lehigh University.

The Center and its two Sites have widely solicited Stage I Problem Statements and, on review of these statements, will solicit Stage II Problem Statements which will be used as the research basis for the Center's Annual Workplan and subsequently for Requests for Proposals (RFP's) which the Center will issue, both in-house and external.

LIST OF FIGURES AND TABLES

GCRMTC QUARTERLY REPORT
January 1, 1995 - March 31, 1995

1. INTRODUCTION

The Gulf Coast Region Maritime Technology Center (GCRMTC) was initiated September 26, 1994 and has filled nearly all its initial positions at both Sites and the Center. The initial thrust of the Center has been for the most part completed. This included the following tasks: 1.) hiring the staff, 2.) renovating office/research space, 3.) purchasing infrastructure software and equipment, purchase office equipment and furniture, 4.) initiating In-House Research projects and 5.) an Environmental Information Center.

The Center has held a workshop which identified major strategic focus areas and identified potential Government/Industry Advisory Board (GIAB) members. The Center nominated a number of individuals to serve on the GIAB and the current members are listed in Appendix A.

2. SEATTLE CONFERENCE SUMMARY

Several of the Center and UNO and Orange Site staff attended the Ship Production Symposium and Exhibition held in Seattle, Washington, January 25-27, 1995. A booth with a video/slide show was set up and manned throughout the exhibition. Additionally, all NSRP panel meetings were attended by one or more Center and Site staff members. Several contacts were made that should prove beneficial in accomplishing present and future projects. The conference had over 400 registered attendees that participated in many technical sessions. Depending on the timing, next year's conference may be a suitable forum to present technical papers resulting from ongoing projects.

3. WORKSHOP NO. 1 (FEBRUARY 22-23, 1995)

The first workshop for the Center was held February 22-23, 1995 at the New Orleans Hilton Riverside Hotel. There were 69 attendees at the workshop, representing 38 maritime industries, 9 government agencies and 4 universities. Five major strategic focus areas were identified by the workshop participants for the Center:

- Catalyzing Change within the Maritime Industry
- Integrating Design and Manufacturing
- Developing Conceptual Designs for Market Niches
- Developing Life Cycle Cost and Reliability Data Bases
- Assessing Environmental Impact of the Maritime Industry

Along with the activities at the Seattle Conference mentioned above, the workshop further enhanced the visibility of the newly formed GCRMTC. An additional benefit of the workshop was the identification of potential GIAB members.

4. STAGE I AND STAGE II PROBLEM STATEMENT SOLICITATION

The Center and its Sites sent out over 230 solicitation letters and made presentations at several NSRP panel meetings to solicit Stage I Problem Statements and received 110 responses by March 31, 1995. The Stage I Problem Statements were reviewed and Stage II Problem Statements solicited. A sample solicitation letter for Stage II Problem Statements and supporting documentation are included in Appendix B.

5. NEW ORLEANS SITE ACTIVITY REPORT

5.1 In-House Research Projects

Eleven research projects were initiated January 1, 1995 after extensive review by the GCRMTC and the Government Program Manager. An additional project which was tentatively approved January 1, 1995 is scheduled to start April 1, 1995. The bulk of the computer software equipment for the projects has been purchased or is out on bids at present.

The quarterly reports of the 11 research projects that commenced during this quarter are attached as appendixes to this report:

GCRMTC Project No.	Title	Appendix
1	Chromium Coatings	C
10	Development of High Speed Marine Vehicle Design Database	D
14	Integrated Optical Fiber Sensor Systems	E
15	PM Motor Drives	F
16	Shipboard Sensors	G

18	Integrated RAM Database	H
20	Performance Simulation of Marine Propulsion Systems	I
23	Structural Design Problems	J
27	Concurrent Engineering Processes in Shipbuilding	K
30	Technology Transfer	L
36	Predicting Ship Roll Damping	M

5.2 Subcontracted Industry Research (NBDL)

A sub-contract was issued to the Naval Biodynamics Laboratory (NBDL) to carry out a research project, "Motion Sickness and Anti-Motion Sickness Treatment". The status of the project is included in Appendix N.

5.3 Infrastructure Build-up Status

The bulk of the infrastructure equipment, directly associated with ongoing research projects, has been ordered or is out on bids at present. The remaining infrastructure equipment has or will shortly be ordered and should be received during the next six months.

5.4 Education and Training

Pursuant to the GCRMTC statement of work, the New Orleans Site plans to undertake several education and training projects to meet the needs of the marine industry. These projects will be based on the February 22-23, 1995 Workshop findings and will be discussed at the May GIAB meeting. At present a workshop is envisioned for Technologies Enabling Agile Manufacturing and Welding (Naval Joining Center) and an Agility Forum is being planned in conjunction with Lehigh University.

6. ORANGE SITE ACTIVITY REPORT

The Orange Site has worked to develop relationships with shipbuilders and repairers in the Beaumont/Orange/Port Arthur area. They have met with representatives from these industries and solicited input relevant to the role of the GCRMTC. Stage II Problem Statements were developed and two were submitted to the GCRMTC Executive Director and are being assessed by the GPM at present.

6.1 Interactions with Local Marine Industries

The Orange Site sponsors monthly meetings, participates in local industry organizations and makes presentations to local industry forums.

The Orange Site held an "Executive Workshop" at Lamar University at Orange (LUO) to introduce a number of invited local shipyards and marine-related vendors to simulation as a tool to effect improvements in business processes.

Attendees included personnel from the following companies: Cragill Steel and Wire, Gulf Copper, Crown Pipe and North Star Steel Texas. Representatives from McDermott, Inc. gave a presentation on its project planning and control system as well as its use of an off-the-shelf object-oriented data base program to provide logistic support information. There was consensus among the attendees that the Executive Workshop is a useful tool for fostering a dialogue between Lamar University, GCRMTC-LUO and local industry. These "Executive Workshops" will continue on a monthly basis.

6.2 Education and Training

The Orange Site has undertaken the following actions with regard to education and training:

1) Discussed availability of summer student internships and faculty training at the SBD facilities with Lamar University Engineering Department, University of New Orleans School of Naval Architecture and Marine Engineering and the University of Michigan Naval Architecture Department,

2) Scheduled a presentation of capabilities of the SBD facilities to McDermott personnel on April 12, 1995 and to SP-6 Panel on April 21, 1995.

3) Initiated planning for a workshop to address Title XI financing of improvements of facilities.

6.3 Sponsorship of NSRP Projects

The Orange Site has proposed funding for an NSRP SP-4 Panel project which involves the translation of the Japanese CIMs report. The project proposal and status was included in the last Quarterly Report and an update follows:

Based on a review of NSRP SP-4 and SP-8 projects, the Orange Site envisions a number of opportunities to use the SBD facility and resources to maximize resources available to address projects of mutual interest. In order to use the funds and infrastructure of the Orange Site efficiently and effectively, it is proposed that several NSRP projects or parts of projects be assigned to the Orange Site. These NSRP projects would include previously unfunded projects as well as FY 96 proposed projects. Table 1 shows a prioritization of NSRP projects which the Orange Site believes would most closely fit its mission and capabilities. The prioritization is indicated by the classification of "close fit" or "partial fit" as given in the last column of Table 1. A "close fit" would be a higher priority item.

6.4 New Project Development

The Orange Site is seeking to initiate several new projects via Stage I Problem Statements. The following discussion indicates some of the activities of interest to the Orange Site.

1) Discussions with Lufkin Industries regarding potential projects related to marine transmission and gearing.

2) Projects are being considered to explore and implement the commercial potential of advances in marine transmission and gearing. Discussions have taken place with NASSCO, Ingalls and McDermott.

3) McDermott appears to be the most promising client-user for the SBD facilities at the Orange Site.

4) Maritime Restoration, Inc., is a small niche cruise ship owner seeking to replace its fleet at or below the world price. This project would integrate design, engineering and planning services provided by the owner's designer. A Stage II Problem Statement will be submitted by April 1, 1995.

5) The Orange Site is exploring with Ocean Energy, a "virtual" design firm, opportunities to collaborate on commercial design projects which will demonstrate SBD, quantify benefits and determine technology or process gaps. Discussions are in process with Elliot-Bay Design Group concerning the use of design files for SBD demonstrations, "shadow" design projects and technology assessment.

7. INITIATION OF CENTERS

The GCRMTC was originally committed to initiating four Centers i.e. Simulation-Based Design Center, Shipbuilding Environmental Resource Center, Shipbuilding Process and Products Standards Center and a Marketing Resource Center. Based on the workshop held February 22-23, 1995 it was decided to table the Shipbuilding Process and Products Standards Center. This Center will be discussed further at the first GIAB meeting in May, 1995.

7.1 Shipbuilding Environmental Resource Center

As noted in the last quarterly report the University of New Orleans already has considerable resources invested in its Urban Waste Management and Research Center (UWMRC) which is a Cooperative Research Center with the EPA. The UWMRC already has established an international reputation in integrated environmental remediation involving land, sea and air pollution. The UWMRC has an Environmental Information Resource Center which has been expanded to include shipbuilding activities and ship operation. The background, mission and

objectives of the Shipbuilding Environmental Resource Center were described in detail in the last Quarterly Report.

The activities planned for the second quarter of 1995 follow:

Much of the activities planned for the second quarter of 1995 are directed at implementing the environmental directions provided by the GCRMTC Workshop 95-1 held February 22-23, 1995. The following support the strategic focus of environmental activities which were identified as an internal mission of the GCRMTC:

1) Development of EIRC one year work plan (budget and Activities).

2) Develop and initiate Center/Industry task force to address Regulatory Impact of Proposed OSHA Air Emission Standards. The task group is being established to formulate and execute a detailed plan of action to interface with OSHA personnel preparing a draft standard, to present the Navy position at public hearing, to assess the compliance methods necessary to cost effectively meet OSHA requirements and to define the magnitude of the economic, health and environmental problem. The tasks include:

a) Identification of Task Force members

b) Establishment of project scope and tasks

c) Task Force Kick-Off Meeting in Crystal City at Westinghouse MTD - April 27

d) Initiation of project activities.

3) Expand the existing environmental database to include NSRP and other reports and projects.

4) Identify resource requirements for support.

5) Investigate the development of an EIRC Industry/Government Environmental Advisory Group and interface with the GCRMTC.

6) Identification of mechanisms for establishing effective industry government relationship (establish mailing list, publications, newsletter, workshop, seminars, etc.)

7.2 Simulation-Based Design Center

LUO has been designated as the Site at which a Center for Research and Applications related to use of simulation in ship design will be established. The facility and network for the Center have been designed to meet the needs and requirements of client users.

Orange Site personnel have visited other organizations where similar research is being carried out. Based on a study of existing facilities the Orange Site staff have determined the skills and knowledge which will be needed by their research staff and are at present purchasing the equipment needed for the Center. The additional necessary staff are being recruited and they along with existing support staff are being trained in the operation of the facility.

Simulation Based Design facility and schedule performance are shown in Figure 1. We anticipate completion of the facilities on or before April 15, 1995.

7.3 International Shipbuilding Marketing Resource Center

A study of the feasibility of an International Shipbuilding Marketing Resource Center is part of the work scope identified in the Statement of Work. The results of the February 22-23 GCRMTC Workshop indicated an interest in activities related to marketing research and development of ship design to meet market niches.

The Orange Site has submitted the appropriate problem statement to the GCRMTC and the GPM for review. The Orange Site has also requested and received a proposal from Professor Howard M. Bunch for his assistance as a consultant in developing the feasibility study work plan. The study is on hold pending the Orange Site's ability to come into compliance with the restrictions placed on the engagement of consultants by the State of Texas.

In the interim, the repair marketing project already proposed represents a significant step in testing the benefits to be derived from such a center. This project has become a high priority for the GCRMTC-LUO because of its impact on local marine industry strategic planning. For example, the Port of Port Arthur which owns the local floating drydock requires this information to determine the feasibility of its repair options for the facility. Similarly, local ship repairers require the information in order to determine their business strategies. Finally, the GCRMTC-LUO will use the information from the marketing study to determine the most effective areas for research and project development.

8. BUDGETS

8.1 Center and UNO Site Budget

Figure 2 depicts the budget submitted to the Government Program Manager from the Center and New Orleans Site.

8.2 Orange Site Budget

Figure 3 represents the Lamar Site budget submitted to the Government Program Manager.

9. SUMMARY

The GCRMTC objectives and milestones as defined by the Cooperative Agreement continue to be met in a timely fashion. The achievements of the two sites and the Center during the first quarter of 1995 were as follows:

1) The GCRMTC was publicized through its activities at the 1995 Ship-Production Symposium and Exhibition, January 25-27, 1995 in Seattle, Washington. The Center set up and operated an exhibition booth to publicize the GCRMTC.

2) The first workshop for the Center was held February 22-23, 1995 at the New Orleans Hilton Riverside Hotel. There were 69 attendees representing 38 maritime industries, 9 government agencies and 4 universities. The outcome included five major strategic focus areas and nominations for the Government/Industry Advisory Board (GIAB).

3) Members of the GIAB were selected and the first meeting was scheduled for May 4, 1995.

4) The Center and its two sites have widely solicited Stage I Problem Statements, received over 110 responses and solicited Stage II Problem Statements. The Stage II Problem Statements after review by the GIAB will form the basis for the GCRMTC Annual Workplan. The Annual Workplan will in turn form the basis for RFP's for internal and external research proposals which, based on available resources, will be funded by the GCRMTC.

5) Progress reports were submitted and reviewed for all 11 ongoing research projects at the New Orleans Site.

6) The third draft of the Procedures Manual was completed in February 1995 and distributed to all Principal Investigators.

7) The GCRMTC initiated the Shipbuilding Environmental Resource Center at the New Orleans Site. The nature of the Center was delineated in the October-December 31, 1994 Quarterly Report and its plans for the April-June 30, 1995 Quarter were outlined.

8) The Orange Site SBD Center is nearing completion and will be operational on or before April 15, 1995.

9) The Orange Site is also responsible for establishing an International Marketing Resource Center which is still in the planning stages at present.

10) Budgets and schedules were again revised at the request of the GPM.

10. RECOMMENDATIONS

Based on a review of the January 1, 1995 to March 31, 1995 activities of the Center and the New Orleans and Orange Sites along with the feedback from the Program Manager and Staff, the following actions are recommended:

1) Complete the second workshop, Mid-July, at the Orange Site to demonstrate the SBD Center capabilities.

2) Solicit Stage II Problem Statements, internal and external, and submit to the GIAB.

3) Initiate the first meeting with the GIAB on May 4, 1995 at the University of New Orleans.

4) Implement the International Marketing Resource Center.

FIGURES AND TABLES:

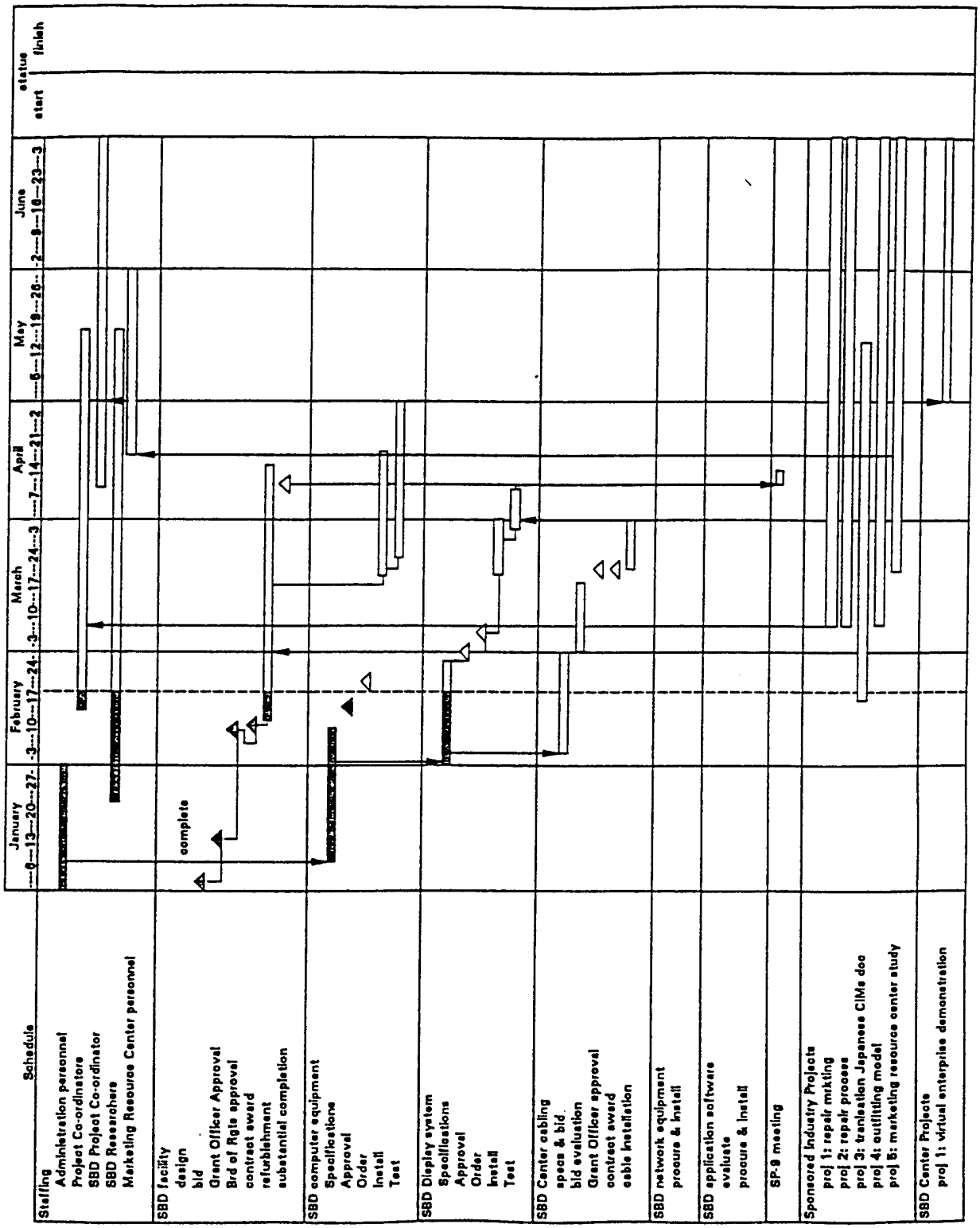

Figure 1 - LUO SBD Facility and Schedule Performance

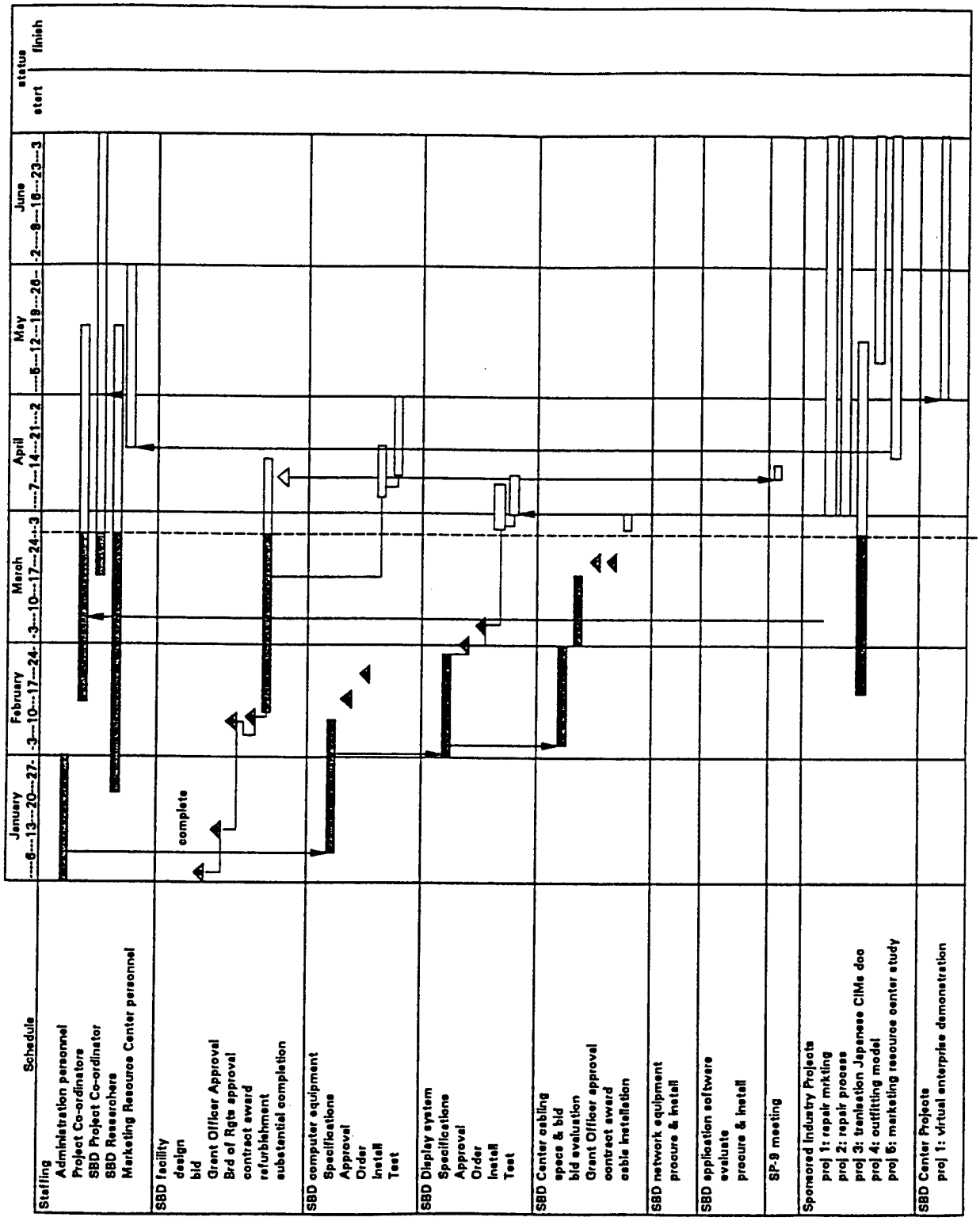

Figure 1 - LUO SBD Facility and Schedule Performance - continued

		Fiscal Year 1995				Fiscal Year 1996			
		UNO Site and Center				UNO Site and Center			
Funding Appropriations		QI - FY 95	QII - FY 95	QIII - FY95	QIV - FY 95	QI - FY 96	QII - FY 96	QIII - FY 96	QIV - FY 96
And Increments		Oct - Dec 94	Jan - Mar 95	Apr - Jun 95	Jul - Sep 95	Oct - Dec 95	Jan - Mar 96	Apr - Jun 96	Jul - Sep 96
	Totals								
FY 93	*$4,220,242*	$2,300,000	$640,080	$640,081	$640,081				
FY 94	*$571,330*			$571,330					
FY 95	*$3,500,000*					$875,000	$875,000	$875,000	$875,000
FY 96	*$1,250,000*								$1,250,000
FY 97	*$5,000,000*								
FY 98	*$5,000,000*								
FY 99	*$5,000,000*								
Internal Expenditures	*Totals*								
Administration	*$946,670*	$42,580	$170,890	$127,890	$127,890	$130,000	$130,000	$130,000	$130,000
Infrastructure	*$260,000*		$125,000			$10,000	$75,000		$70,000
Professional Services	*$14,700*				$2,940	$2,940	$2,940	$2,940	$2,940
Environmental Center	*$673,375*			$50,000	$124,675	$124,675	$124,675	$124,675	$124,675
Education/Training	*$12,500*				$2,500	$2,500	$2,500	$2,500	$2,500
Workshop	*$56,400*		$14,100		$14,100		$14,100		$14,100
LU 3% Administration	*$246,720*	$34,035	$34,035	$34,035	$34,035	$27,645	$27,645	$27,645	$27,645
Sub-Total		$76,615	$344,025	$211,925	$306,140	$297,760	$376,860	$287,760	$371,860
In-House Projects	*Totals*								
Jan - Dec 95	*$2,665,287*		$1,233,237	$477,350	$477,350	$477,350			
Jul95-Jun96	*$1,000,000*				$400,000	$200,000	$200,000	$200,000	
Jan96-Dec96	*$958,152*						$319,384	$319,384	$319,384
Jul96-Jun97	*$300,000*								$300,000
Jan97-Dec97	*$0*								
Jul97-Jun98	*$0*								
Jan98-Dec98	*$0*								
Jul98-Jun99	*$0*								
Jan99-Dec99	*$0*								
Jul99-Jun00	*$300,000*								
Sub-Total	*$5,223,439*		$1,233,237	$477,350	$877,350	$677,350	$519,384	$519,384	$619,384
Subcontracted Projects	*Totals*								
Jan 95 NDBL	*$100,000*			$25,000	$25,000	$25,000	$25,000		
Oct95-Sep96	*$1,200,000*					$300,000	$300,000	$300,000	$300,000
Apr96-Mar97	*$500,000*							$200,000	$300,000
Oct96-Sep97	*$0*								
Apr97-Mar98	*$0*								
Oct97-Sep98	*$0*								
Apr98-Mar99	*$0*								
Oct98-Sep99	*$0*								
Apr99-Mar00	*$0*								
Sub-Total	*$1,800,000*			$25,000	$25,000	$325,000	$325,000	$500,000	$600,000
Totals		$76,615	$1,577,262	$714,275	$1,208,490	$1,300,110	$1,221,244	$1,307,144	$1,591,244
Funding Balance		$2,223,385	$1,286,203	$1,783,339	$1,214,930	$789,820	$443,576	$11,432	$545,188
Industry	*Totals*								
Collaboration Revenues	*$1,000,000*			$100,000	$100,000	$200,000	$200,000	$200,000	$200,000
Expenditures	*$1,000,000*			$100,000	$100,000	$200,000	$200,000	$200,000	$200,000

Figure 2 - GCRMTC and New Orleans Site Budget

	Fiscal Year 1997				Fiscal Year 1998				Fiscal Year 1999			
	UNO Site and Center				UNO Site and Center				UNO Site and Center			
Funding Appropriations	**QI - FY 97**	**QII - FY 97**	**QIII - FY 97**	**QIV - FY 97**	**QI - FY 98**	**QII - FY 98**	**QIII - FY 98**	**QIV - FY 98**	**QI - FY 99**	**QII - FY 99**	**QIII - FY 99**	**QIV - FY 99**
And Increments	**Oct - Dec 96**	**Jan - Mar 97**	**Apr - Jun 97**	**Jul - Sep 97**	**Oct - Dec 97**	**Jan - Mar 98**	**Apr - Jun 98**	**Jul - Sep 98**	**Oct - Dec 98**	**Jan - Mar 99**	**Apr - Jun 99**	**Jul - Sep 99**
FY 93												
FY 94												
FY 95												
FY 96	$1,250,000	$1,250,000	$1,250,000									
FY 97			$1,250,000	$1,250,000	$1,250,000	$1,250,000						
FY 98							$1,250,000	$1,250,000	$1,250,000	$1,250,000		
FY 99											$1,250,000	$1,250,000
Internal Expenditures												
Administration	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000	$130,000
Infrastructure	$75,000		$75,000									
Professional Services	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940	$2,940
Environmental Center	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675	$124,675
Education/Training	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
Workshop		$14,100		$14,100		$14,100		$14,100		$14,100		$14,100
LU 3% Administration	$7,500	$7,500	$7,500	$7,500	$37,500	$37,500	$37,500	$37,500	$37,500	$37,500	$37,500	$37,500
Sub-Total	$342,615	$281,715	$342,615	$281,715	$297,615	$311,715	$297,615	$311,715	$297,615	$311,715	$297,615	$311,715
In-House Projects												
Jan - Dec 95												
Jul95-Jun96												
Jan96-Dec96	$319,384											
Jul96-Jun97	$300,000	$300,000	$300,000									
Jan97-Dec97		$300,000	$300,000	$300,000	$300,000							
Jul97-Jun98				$300,000	$300,000	$300,000	$300,000					
Jan98-Dec98						$300,000	$300,000	$300,000	$300,000			
Jul98-Jun99								$300,000	$300,000	$300,000	$300,000	
Jan99-Dec99										$200,000	$225,000	$250,000
Jul99-Jun00												$200,000
Sub-Total	$619,384	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$500,000	$525,000	$450,000
Subcontracted Projects												
Jan 95 NDBL												
Oct95-Sep96												
Apr96-Mar97	$300,000	$300,000										
Oct96-Sep97	$300,000	$300,000	$300,000	$300,000								
Apr97-Mar98			$300,000	$300,000	$300,000	$238,500						
Oct97-Sep98					$238,500	$238,500	$238,500	$238,500				
Apr98-Mar99							$238,500	$238,500	$238,500	$238,500		
Oct98-Sep99									$238,500	$200,000	$225,000	$250,000
Apr99-Mar00											$200,000	$200,000
Sub-Total	$600,000	$600,000	$600,000	$600,000	$538,500	$477,000	$477,000	$477,000	$477,000	$438,500	$425,000	$450,000
Totals	$1,561,999	$1,481,715	$1,542,615	$1,481,715	$1,436,115	$1,388,715	$1,374,615	$1,388,715	$1,374,615	$1,250,215	$1,247,615	$1,211,715
Funding Balance	$233,189	$1,474	$958,859	$727,144	$541,029	$402,314	$277,699	$138,984	$14,369	$14,154	$16,539	$54,824
Industry												
Collaboration Revenues	$300,000	$300,000	$300,000	$300,000	$400,000	$400,000	$400,000	$400,000	$500,000	$500,000	$500,000	$500,000
Expenditures	$300,000	$300,000	$300,000	$300,000	$400,000	$400,000	$400,000	$400,000	$500,000	$500,000	$500,000	$500,000

Figure 2 - GCRMTC and New Orleans Site Budget - continued

GULF COAST REGION MARITIME TECHNOLOGY CENTER
CENTER AND ORANGE SITE PLANNING BUDGET

Funding Appropriations And Investments		Fiscal Year 1995 LUO Site and Center				Fiscal Year 1996 LUO Site and Center				Fiscal Year 1997 LUO Site and Center				Fiscal Year 1998 LUO Site and Center				Fiscal Year 1999 LUO Site and Center			
		QI-FY 95 Oct-Dec 94	QII-FY 95 Jan-Mar 95	QIII-FY 95 Apr-Jun 95	QIV-FY 95 Jul-Sep 95	QI-FY 96 Oct-Dec 95	QII-FY 96 Jan-Mar 96	QIII-FY 96 Apr-Jun 96	QIV-FY 96 Jul-Sep 96	QI-FY 97 Oct-Dec 96	QII-FY 97 Jan-Mar 97	QIII-FY 97 Apr-Jun 97	QIV-FY 97 Jul-Sep 97	QI-FY 98 Oct-Dec 97	QII-FY 98 Jan-Mar 98	QIII-FY 98 Apr-Jun 98	QIV-FY 98 Jul-Sep 98	QI-FY 99 Oct-Dec 98	QII-FY 99 Jan-Mar 99	QIII-FY 99 Apr-Jun 99	QIV-FY 99 Jul-Sep 99
	Totals																				
FY 93	$4,401,756	$1,100,440	$1,100,440	$1,100,440	$1,100,440																
FY 94	$3,573,420			$290,000	$133,459	$740,000	$740,000	$740,000	$740,000	$162,251	$87,710										
FY 95	$1,000,000									$250,000	$250,000	$250,000	$250,000								
FY 96	$5,000,000													$1,250,000	$1,250,000	$1,250,000	$1,250,000				
FY 97	$5,000,000																	$1,250,000	$1,250,000	$1,250,000	$1,250,000
Internal Expenditures	Totals																				
Administration	$4,379,494	$34,134	$126,356	$282,616	$258,113	$268,824	$268,824	$268,824	$268,824	$222,475	$222,563	$222,563	$222,563	$199,110	$199,209	$199,209	$199,209	$203,094	$203,990	$203,990	$203,990
Information	$3,719,701	$22,500	$125,171	$2,231,270	$330,000	$81,250	$81,250	$81,250	$81,250	$4,006	$3,918	$3,918	$3,918	$81,250	$81,250	$81,250	$81,250	$81,250	$81,250	$81,250	$81,250
Marketing Revenue Ctr Workshop	$353,000			$47,500	$47,500	$50,000	$50,000	$50,000	$50,000	$5,000	$5,000	$5,000	$5,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
5 % Administration	$1,405,717	$4,531	$20,136	$241,133	$91,770	$54,815	$54,815	$54,815	$54,815	$26,093	$25,016	$18,519	$18,519	$92,593	$92,593	$92,593	$92,593	$92,593	$92,593	$92,593	$92,593
Sub-Totals	$9,999,912	$61,167	$271,843	$2,802,519	$747,383	$454,889	$454,889	$454,889	$454,889	$257,574	$256,497	$250,000	$250,000	$402,961	$403,052	$403,052	$403,052	$401,739	$407,833	$407,833	$407,833
In-House Projects	Totals																				
Jan93-Dec93	$472,142			$236,389	$345,753																
Jul93-Jun94	$427,667					$142,556	$142,556	$142,556													
Jan94-Dec96	$142,556								$142,556												
Jul96-Jun97	$47,339									$47,339											
Jan97-Dec97	$40,607										$40,607										
Jul97-Jun98	$1,270,468													$423,520	$423,474	$423,474					
Jan98-Dec98	$423,474																$423,474				
Jul98-Jun99	$1,263,296																	$421,131	$421,084	$421,084	
Jan99-Dec99	$421,084																				$421,084
Sub-Totals	$4,908,633			$236,389	$345,753	$142,556	$142,556	$142,556	$142,556	$47,339	$40,607			$423,520	$423,474	$423,474	$423,474	$421,131	$421,084	$421,084	$421,084
Subcontracted Projects	Totals																				
Jan93-Dec93	$472,142			$236,389	$345,753																
Oct93-Sep94	$285,111					$142,556	$142,556														
Apr96-Mar97	$285,111							$142,556	$142,556												
Oct96-Sep97	$87,943									$47,339	$40,607										
Apr97-Mar98	$1,270,468													$423,520	$423,474	$423,474					
Oct97-Sep98	$423,474																$423,474				
Apr98-Mar99	$1,263,296																	$421,131	$421,084	$421,084	
Oct98-Sep99	$421,084																				$421,084
Apr99-Mar00																					
Sub-Totals	$4,508,633			$236,389	$345,753	$142,556	$142,556	$142,556	$142,556	$47,339	$40,607			$423,520	$423,474	$423,474	$423,474	$421,131	$421,084	$421,084	$421,084
GRAND TOTAL		$61,167	$271,843	$3,255,297	$1,238,889	$740,000	$740,000	$740,000	$740,000	$352,251	$337,710	$250,000	$250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000	$1,250,000
Funding Balance		$1,039,272	$1,867,847	$2,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Industry	Totals																				
Collaboration Revenues	$1,940,000					$30,000	$30,000	$30,000	$30,000	$50,000	$90,000	$130,000	$130,000	$130,000	$130,000	$180,000	$180,000	$180,000	$180,000	$180,000	$180,000
Expenditures	$1,940,000					$30,000	$30,000	$30,000	$30,000	$50,000	$90,000	$130,000	$130,000	$130,000	$130,000	$180,000	$180,000	$180,000	$180,000	$180,000	$180,000

Figure 3 - LUO Budget

TABLE 1 - Prioritization of NSRP Projects

		LU component	amount	estimate source	LU Resource	budget account	fit
SP-1							
A1-96-01	Environmental Training Requirement Matrix for Trades	sponsor/participate	$ 29,000.00	abstract	GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
A1-96-07	Seminar on Shipyard Environmental Issues related to shipbuilding	sponsor/participate	$ 30,000.00	LUO	GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
A1-96-20	Source Elimination - Build an Environmentally Friendly Ship	sponsor/participate	$ 100,000.00	abstract	GCRMTC sponsor SBO/UNO	Sponsored projects	partial
A1-96-34	Shipyard Environmental Education and Training Program	sponsor/participate	$ 200,000.00	abstract	GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
SP-4							
FY 96 proj	Development of STEP Ship Product Model Data Set	sponsor/participate	$$$$$$$$$$	proposal abstract	GCRMTC sponsor SBO/ECRC participate	SBO projects	close
FY 96 proj	Production Process Simulation for Design	sponsor/participate	$ 134,000.00	proposal abstract	GCRMTC sponsor SBO/ECRC/eng dept. participate	SBO projects	close
FY 96 proj	Activity Analysis for a Design Model	sponsor/participate	$ 200,000.00	proposal abstract	GCRMTC sponsor SBO/eng dept. participate	SBO projects	partial
FY 96 proj	Parametric and Modular Ship Design Development	sponsor/participate	$ 345,300.00	proposal abstract	GCRMTC sponsor SBO/Mkt res ctr participate	SBO projects	close
FY 96 proj	Stable Processes and Product Work Breakdown Structure, Requirements, Application, and Pilot Implementation	sponsor/participate Phase II	$ 278,000.00	proposal abstract	GCRMTC sponsor SBO/ATDI participate	Mkt Ctr projects	partial
FY 96 proj	Definition and Design of Outfitting Units for Commercial Vessels	sponsor/participate	$ 274,000.00	proposal abstract	sponsor SBO participate	SBO projects	close
FY 96 proj	Translation and analysis of recent Japanese work in design for production	sponsor/participate	$ 75,000.00	proposal abstract	GCRMTC sponsor Mkt res GCRMTC participate	Mkt Ctr projects	partial
FY 96 proj	Tanker Midbody Unit Design Manual	sponsor/participate	$ 100,000.00	proposal abstract	sponsor SBO participate	SBO projects	partial
FY 96 proj	Training for Design/Production Personnel in Common Commercial Ship Requirements	participate	$ 172,000.00	proposal abstract	sponsor ITDI/Mkt res ctr participate	Mkt Ctr projects	partial
FY 96 proj	Product Model Based Planning and Scheduling	sponsor/participate	$ 164,000.00	proposal abstract	sponsor SBO participate	SBO projects	close
SP-5							
NS-92-2	Union Supported Safety participate Teams Phase II	sponsor/participate			GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
NS-94-5	Union Driven Safety participate Team Presentation at Public and Private Shipyards	sponsor/participate			GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
NS-95-1	OSHA Technical Support Advisory Committee	sponsor/participate			GCRMTC sponsor JGI participate	Sponsored projects	partial
NS-95-2	Shipyard Ergonomic Study	sponsor/participate	$ 75,000.00	request for proposal	GCRMTC sponsor JGI participate	Sponsored projects	partial
SP-6							
SP-8							
SP-9							
NS-95-2	Implementation of Past NSRP Research Through Education and Training	sponsor/participate	$ 101,250.00	initiatives summary	GCRMTC sponsor JGI/ATDI participate	Sponsored projects	partial
NS-95-3	Development of Two Interactive Multimedia Training Modules	sponsor/participate		initiatives summary	GCRMTC sponsor ITDI participate	Sponsored projects	close

APPENDIX A

GOVERNMENT/INDUSTRY ADVISORY BOARD (GIAB)

GULF COAST REGION MARITIME TECHNOLOGY CENTER
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New Orleans, LA 70148

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APPENDIX B

STAGE II PROBLEM STATEMENT SOLICITATIONS

GULF COAST REGION MARITIME TECHNOLOGY CENTER
College of Engineering
University of New Orleans
New Orleans, LA 70148

STAGE II PROBLEM STATEMENT SOLICITATION LETTER

April 6, 1995

«PRE» «FIRST» «MID» «LAST»
«POSITION»
«COMPANY»
«ADDR1»
«ADDR2»
«CITY» «ST» «ZIP»

Dear «PRE» «LAST»:

Thank you for your recent submission of a Stage I Problem Statement. We have received a relatively large number of submissions which has delayed our response slightly. Since we are on a very tight time frame, I would like to ask you to submit a Stage II Problem Statement no later than April 25th so that we can consolidate all of the submissions into a package for the Government/Industry Advisory Board (GIAB) meeting scheduled for early May.

I expect the GIAB to review the Stage II Statements, approve our annual work plan, and recommend which of the Statements should be forwarded to the Government Program Manager in Washington for final decision as to which should form the basis for Requests for Proposals (RFPs) to be subsequently funded. I must caution that there are limited funds and this in turn limits the number of actual projects we can fund each year.

For your reference, I have enclosed a Stage II form and brief instructions. Should you decide to respond, please fax your input in order to avoid mail delays. If you have questions, please fax them to us so that we can respond more quickly.

Sincerely,

John N. Crisp, PhD, PE
Executive Director

Encl: Stage II Problem Statement Form

PROBLEM STATEMENT FORM - Page 1

Rev. 02/5/95

GCRMTC USE ONLY
PROBLEM STATEMENT _____
DATE OF RECEIPT _____

STAGE II PROBLEM STATEMENT

I. PROBLEM TITLE:

II. PROBLEM STATEMENT:

III. RESEARCH PROPOSED AND HOW IT RELATES TO ENHANCING U.S. SHIPBUILDING COMPETITIVENESS AND/OR U.S. NAVY INTERESTS:

IV. OBJECTIVES OF RESEARCH (*by applicable task, i.e. surveying, design, prototyping, testing, reports, training, deliverables, etc.*)

PROBLEM STATEMENT FORM - Page 2

V. SURVEY OF CURRENTLY AVAILABLE INFORMATION (*including industry need*):

VI. EQUIPMENT (*provide list with estimated cost*):

VII. ESTIMATED COST AND TIME REQUIRED (*correlate proposal task to funding profile*):

VIII. POTENTIAL IMPLEMENTATION OF RESULTS:

IX. SUBMITTED BY:

NAME: _____

TITLE: _____

AFFILIATION: _____

ADDRESS: _____

_____

_____

PHONE NO: _____

NOTE: Submitter may attach continuation sheets if necessary.

2.2.4.2 STAGE II PROBLEM STATEMENT

This second stage of problem statement development represents the review and refinement of Stage I statements which have been selected by the appropriate GCRMTC Site for possible solicitation of proposals which, on approval, will be included in the annual work plan. An achievable objective is developed using the researcher's knowledge and the experience and expertise of the GCRMTC Sites and the GIAB. The final Stage II problem statement will, upon approval of the GPM, form the basis for requests for proposals (RFPs). (Note that there are two types of proposals, i.e. solicited and unsolicited. See Section 2.3.1.2. The current discussion addresses solicited proposals.) The required elements of the Stage II Problem Statement are shown in Figure 2-3. In addition to the refinement of the elements of the Stage I statement, the supplemental elements of this problem statement are briefly described as follows:

(1) RESEARCH PROPOSED AND HOW IT RELATES TO ENHANCING U.S. SHIPBUILDING COMPETITIVENESS AND/OR U.S. NAVY INTERESTS - A brief description of these research development or evaluation type activities proposed in order to resolve the problems.

(2) OBJECTIVE OF RESEARCH - A clear, concise and comprehensive description should be given of the goals which are anticipated to be attained through the proposed research. Emphasis should be placed on results which address Navy and commercial initiatives and priorities, and the dissemination of information, including educational programs.

(3) SURVEY OF CURRENTLY AVAILABLE INFORMATION - A literature search should have been undertaken during the formulation of a Stage II Problem Statement to define the state-of-the-art relative to the problem. Consideration should be given to the work previously performed or underway by all research agencies and institutions and to contact personnel who are knowledgeable in the subject technical area. On some occasions the literature search yields existing information which offers satisfactory solutions to the problem and hence the problem statement should be removed from consideration.

(4) EQUIPMENT - List the non-expendable equipment and estimate cost for the project time frames. Non-expendable is defined as having a useful life of over 1 year and an acquisition cost of more than $300.00.

(5) ESTIMATED COST AND TIME REQUIRED - A realistic estimate of the time and cost required to accomplish the research objective should be shown.

(6) POTENTIAL IMPLEMENTATION OF RESULTS - A brief description should state how it is anticipated that the results of the proposed research will be applied. This description should also include a statement regarding technology transfer and potential commercialization of technology.

APPENDIX C

INEXPENSIVE NON-TOXIC PIGMENT SUBSTITUTE FOR CHROMIUM IN PRIMER FOR ALUMINUM SUBSTRATE

GCRMTC PROJECT NO. 1

Principal Investigator: **Alfred F. Daech**
Department of Civil and Environmental Engineering

Additional Researcher: **Kenneth L. McManis**
Department of Civil and Environmental Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: Lithium salts and metals of certain varieties and alloys make aluminum surfaces passive and provide corrision resistance. In this project we attempt to optimize the process, and produce a coating.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 119,436
FUNDS REMAINING	$ 90,780

ACCOMPLISHMENTS THIS PERIOD:

1) Set up lab.

2) Search and study literature.

3) Select ideal equipment.

4) Establish contacts in Navy.

5) Coordinate with manufacturer

PROPOSED ACTIVITIES NEXT PERIOD:

1) Begin pigment tests.

2) Start graduate work.

3) Select and obtain Chemicals and metals.

Abstract

Lithium Carbonate in solution has been shown to protect certain metals, particularly aluminum, from corrosion by reacting at the surface. SIMS (Secondary Ion Mass Spectrometer) confirms this phenomena. Sodium carbonate and potassium carbonate reactions produce a soluble product and no alkali is detected on the surface by SIMS. Because of their high solubility and reactivity

most "alkaline metal" compounds are not suitable for corrosion protection. Metallic aluminum normally provides its own corrosion protection due to its tendency to form an aluminum oxide insulator on the surface, but the matrix of hydrated aluminum oxide is penetrated by chemicals such as NaCl, acid and bases.

Scientists observed that certain aluminum-lithium alloys demonstrated some diffusion of lithium to the surface of the alloy. The lithium ion is so small that it penetrates the aluminum oxide layer. The infusion is limited to surfaces apparently because the aluminum - lithium alloys are stable in chemical composition. The phenomenon is obviously not completely understood.

It appears that certain lithium alloys or compounds can be incorporated into a paint vehicle or otherwise deposited on the surface of aluminum alloys to provide corrosion protection when exposed to salt water, humidity and other corrosive environments.

The corrosion propensity of the various alloys of aluminum may be measured by electrochemical techniques. Electrochemical techniques of corrosion testing have continued to be attractive to investigators interested in corrosion. The imposition of a controlled potential via a potentiostat is a very attractive concept from a reaction kinetics point of view. Furthermore, electrical currents are simple to measure and can be directly related to electrochemical reactions rates through Faraday's Law. AC techniques can be used to determine film resistivity and thickness values. A variety of electrochemical tests have been proposed and developed.

This technique will be used to screen the proposed corrosion inhibitors (See Appendix A). In Phase II selected ASTM corrosion tests will be used to verify performances as required by Military specifications and as coordinated with Navy.

We will be using the metals substrates representative of the Navy requirements. Concentrations of the inhibitors will be maintained where possible at a pigment volume of 35%. Final amounts may vary, but the fundamental considerations at this screening are whether or not the inhibitor is in fact passivating, and what is the comparative rating to each inhibitor based on electrochemical corrosion results.

Once corrosion inhibitors have been selected they will be incorporated into paints and tested to traditional panel tests such as Salt Spray B117, Acetic Acid Salt Spray B287 and other tests as itemized in the proposal and deemed necessary by Navy personnel.

Preliminary tests were performed by Mr. Daech demonstrating that Aluminum-Lithium pigment in an acrylic vehicle does inhibit corrosion of aluminum substrates in salt spray and humidity tests.

The objectives of this project are to up-grade the lithium pigment, optimize the pigment and formulate an essentially non-toxic paint using recent innovations.

Introduction

The United States Navy has established an operations requirement for primers for aluminum which can be applied by personnel while on patrol. The desired product must be a fire retardant, general purpose primer which will be both protective for the exterior as well as the interior surfaces of aluminum. Material selection and usage are rigidly governed by codes; for example, those contained in proposed contaminant restrictions.

Currently the Navy utilizes chromium compounds to provide outstanding corrosion protection of certain metals. Chromates are used in the chemical conversion coating of Aluminum, (MIL-C-5541). Chromates have reportedly been determined to be carcinogenic and therefore a replacement for them is currently being sought by the Navy. Environmental Agencies limit the amount of chromium ion tolerated in waste water to less than one part per million. Thus an environmentally benign substitute is desired. Since most available corrosion inhibitors are based on heavy metals or reactive amides, the available alternates appear to fall short of the desired performance in corrosion inhibition and/or environmental suitability.

Various lithium compounds appear to offer a viable alternative to chromium using a new concept of corrosion inhibition.

Objective

One objective of this project is to identify or create new corrosion inhibitors based on aluminum-lithium to a degree where they will represent a satisfactory substitute for the chromium now used in paints for aluminum.

The second objective will be to incorporate this pigment into a paint vehicle which can be used as a primer and which is essentially non-polluting.

Finally, the objective will be to accommodate the products to Navy requirements for various paint specifications where possible and to arrange a manufacturing facility.

Scope

The scope of this project as described is very broad. Obviously one cannot develop a new concept in coatings and follow through to a broad set of specifications and uses in one or two years for a few hundred thousand dollars.

However, we will demonstrate that the product can fulfill all of the requirements from the pigment concept to the final use. The pigment will be investigated in detail. The coating will utilize existing vehicles i.e. latexes, etc. used by the Navy under military specifications with chromate pigments.

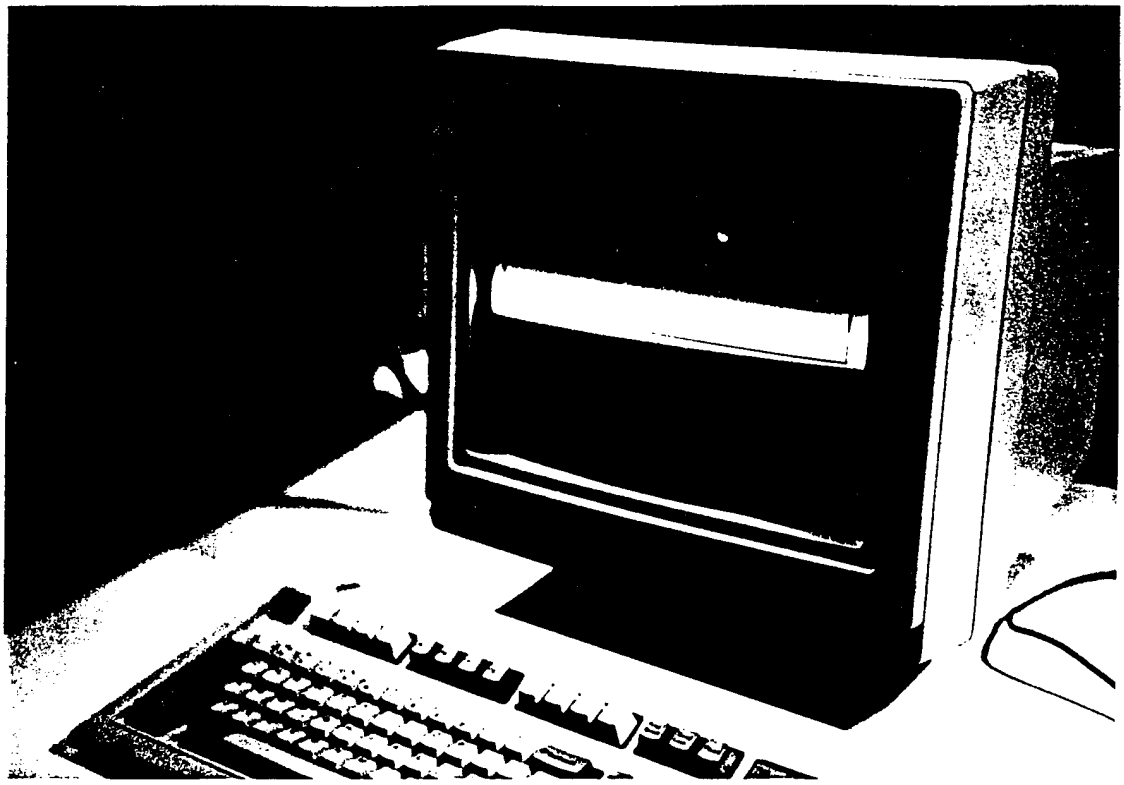
We will then assess the suitability of the developed product to meet existing specifications and propose modifications, inserts, or deletions.

Method of Procedure

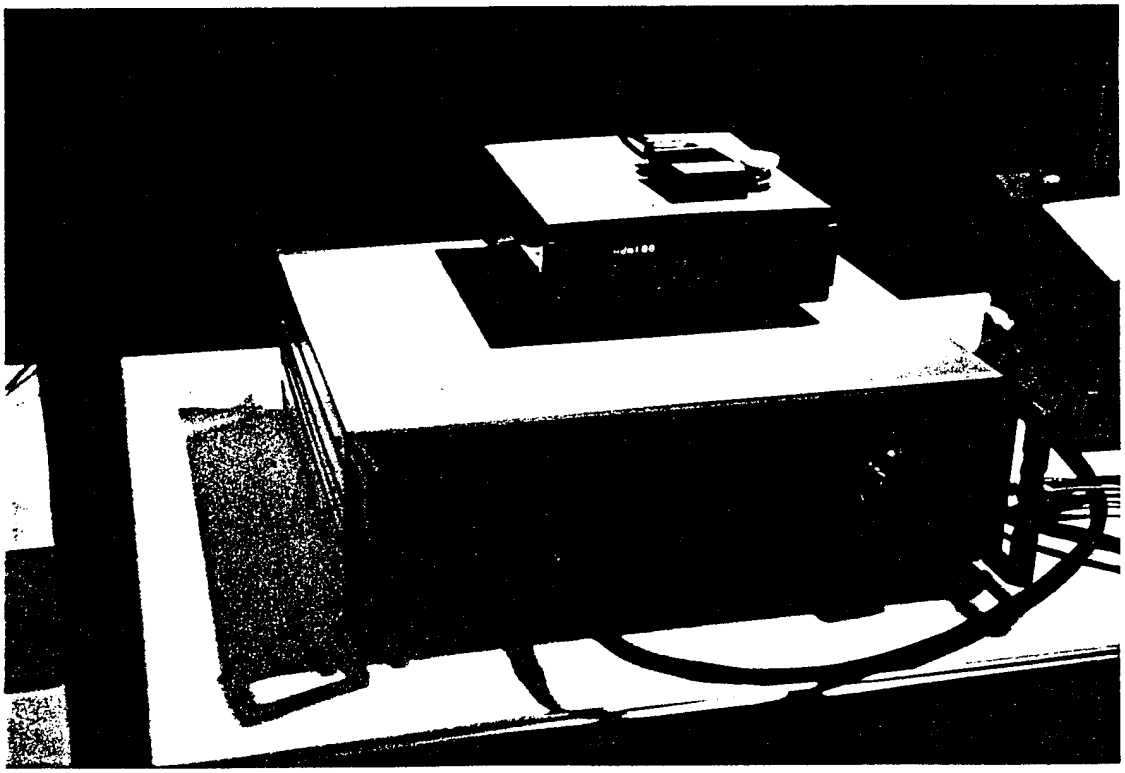
The schematic diagram Figure 1 represents the plan for testing the pigments when the new equipment is installed. The photograph shows the unit which determines by current flow the effectiveness of a pigment. The unit is a 263A potentiostat and is now on order. It is supplemented by a Zenith 486 computer which is in place and a cell which will be provided by EG&G Instruments, when they arrive to setup the machine and instruct us in its use.

In April, we will meet with EURO Navy to discuss manufacturing and testing of coatings. We will attend the Steel Structures Painting Council SP-3 Committee meeting in Washington and we will visit NAVSEA to select materials to be coated and tested.

The equipment will be installed and testing will begin.

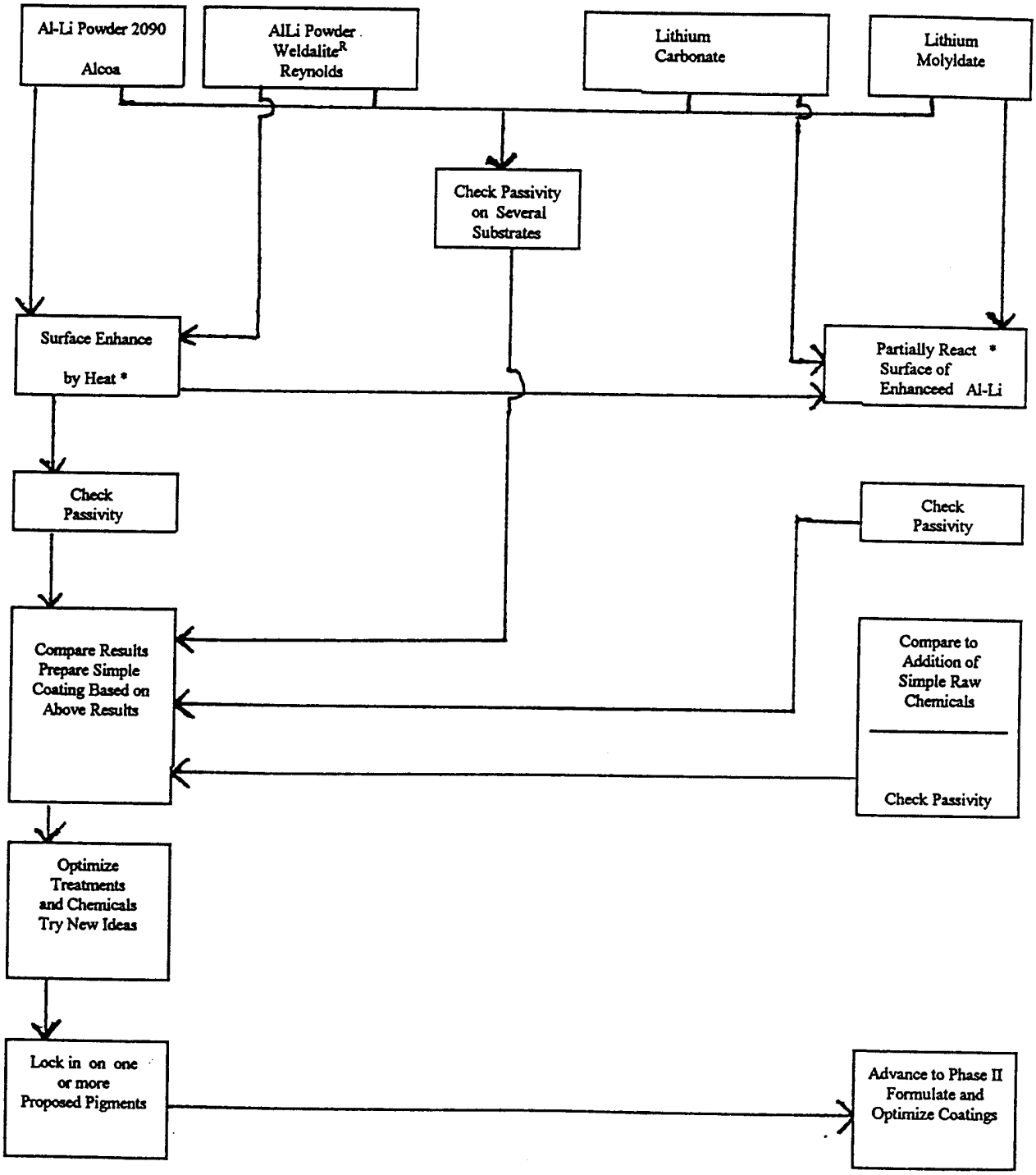


COMPUTER & SOFTWARE



POTENTIOSTAT

Pigment Analyses



* New Concepts

Discussion of Results

Literature Search and Study

More than 300 references were found in the search which was concentrated in the 1990-1994 time frame with a few earlier dates.

The bulk of the work was directed toward the lithium battery and lighweight aeerospace metals. This data was significant as will be discussed.

The fact that lithium passivates aluminum did not go unnoticed. A patent was issued in 1994 to R.G. Buchheit on what is called a "talc" coating for aluminum. Talc is a hydrated lithium aluminum carbonate. This is a surface pre-treatment with the lithium solution and a cure of 200 to 300^{o} C to produce a coating similar to the chromate conversion coating. According to the author the resulting product is superior to the traditional chromate conversion coating in many respects. Another such coating is offered by a California firm which uses a series of washes including permanganate.

No one, however, has proposed or offers a lithium pigment approach to the corrosion inhibition which is much preferred due to its utility. In this respect we remain unique.

Some 60 papers have been ordered and received and studied. It will take some time to digest all of the data. Two investigators have been contacted by phone. All of the documents have been read once or twice and valuable information has been received. Briefly the most significant appear to be:

1. "Non-Chromate Talc Conversion Coatings for Aluminum". Paper No. 542 NACE Corrosion 94; R. G. Buchheit, C. A. Drewien, J.L. Finch; Sandia

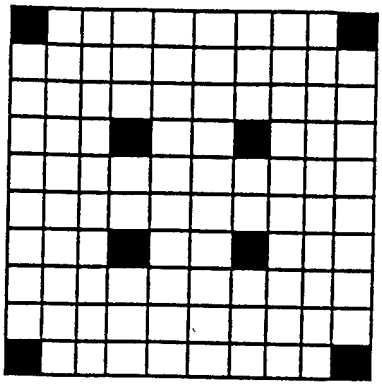
2. "Simple Source of Li Metal for Evaporators in Ultrahigh Vacuum.", J. Vac. Sci Tech.nology A 12(6) No. 0/Dec 1994; F.J. Esposito, K. Griffiths, and P.R. Norton; Vor Guntario

3. "Surface Segregation of Lithium in Aluminum-lithium Alloys." Physics and Chemistry of Materials Treatment; G.G. Bondarenko and S.I. Kucheryaugi; Translation from Russian.

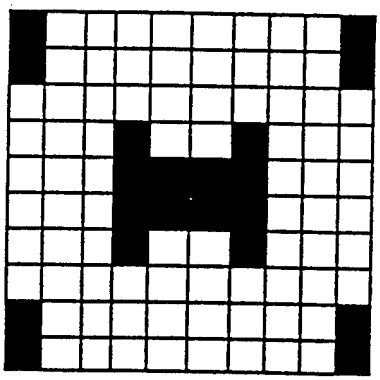
4. "Electrochemical Investigation of the Diffusion of Lithium in Beta-Lithium Aluminum Alloy at Room Temperature." N. Kumagai; Y. Kikuchi, K. Tanno; Iwate University, Japan.

The original work done by the author about five years ago demonstrated some promise of the aluminum-lithium pigment but it was apparent that some enhancement would be required for practical applications.

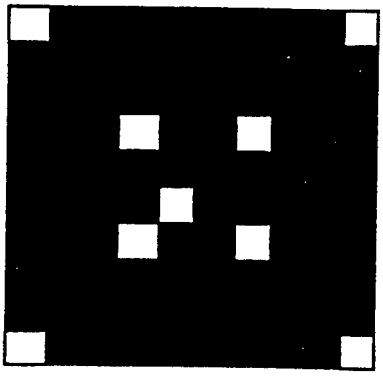
Surface Enhancement



At Wt 6.94: 2.3% Li by wt.
97.7% Al by Wt
At Wt 26.98
Normally about 8% of surface
Normal distribution of lithium on Al-Li (such as 2090) surface



Expt 1. Minimum Al-Li on Surface



91% Theortical

Aluminum-Lithium Alloys are limited to 3% of solibility of Lithium although some have been made up to 6% or so experimentally.
The areas shown are approximations. The black squares represent Lithium on surface, the white squares represent aluminum. Other metals, oxygen an water will also be present.
The squares represent % of lithium and aluminum by volume.

ENCLOSURE (1)

D C Corrosion System Simplified

The following is a simplified explanation of the corrosion process and the operation of the equipment we intend to use. It is intended to provide the layman with some understanding of a complex process with many variations and pitfalls.

The electrochemistry system is comprised of a 486DX computer, 352 software for the computer, a 263A potentiostat to provide current and to measure the flow of that current through the "cell", and a cell which contains pure water, the chemical inhibitor and the aluminum metal corrosion specimen.

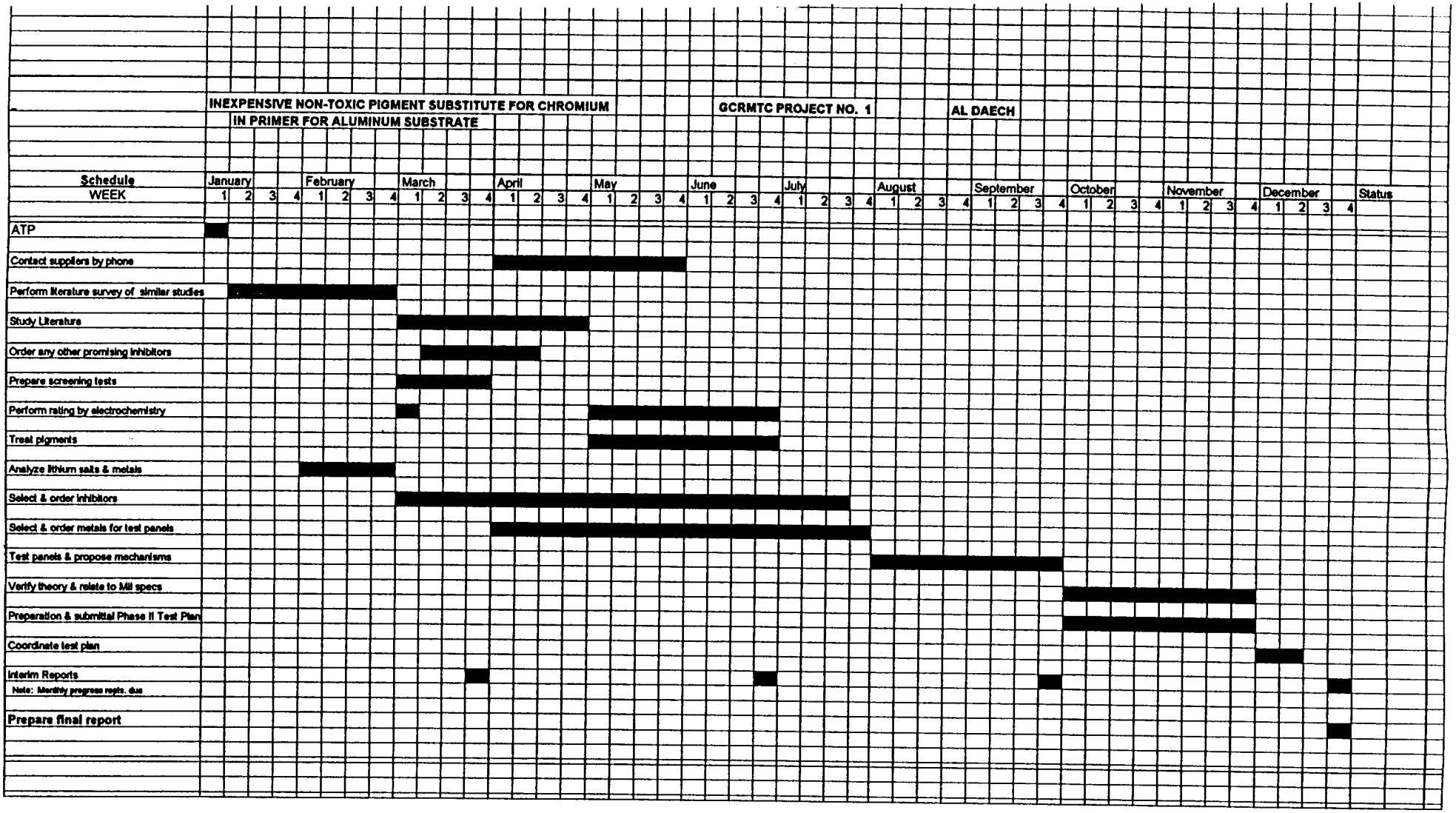
Corrosion is generally an electrical process with an anode and a cathode. The metal is oxidized and some other chemical is reduced similar to the function of a battery. Thus we have "cathodic protection" by counteracting the electrical current in the corrosion process or "galvanic protection" in which a preferentially reactive metal is sacrificed to protect the base metal such as zinc or steel.

In order to determine how corrosive an environment is, we must expose the metal to the elements and measure the depth of pits of metal weight loss. This is usually a long process taking months or years and sometimes the environment is inconvenient to access.

So methods have been developed to accelerate testing from days to hours. For example, weatherometers simulate the cycles of normal weather (i.e. sun and rain). Corrosion is also frequently accelerated within some range by elevated temperature, so some testing is done at 160^0F. (Usually below water's boiling point).

More recently the trend has been to test the resistance to corrosion where possible by measuring the flow of electricity to a one square inch panel of the metal to be protected through a solution of the selected inhibitor in a test cell..

If the inhibitor does its job, the surface will rapidly become passivated and the current will cease to flow.


INEXPENSIVE NON-TOXIC PIGMENT SUBSTITUTE FOR CHROMIUM
IN PRIMER FOR ALUMINUM SUBSTRATE
GCRMTC PROJECT NO. 1
AL DAECH
Schedule
WEEK
January
February
March
April
May
June
July
August
September
October
November
December
Status
ATP
Contact suppliers by phone
Perform literature survey of similar studies
Study Literature
Order any other promising inhibitors
Prepare screening tests
Perform rating by electrochemistry
Treat pigments
Analyze lithium salts & metals
Select & order inhibitors
Select & order metals for test panels
Test panels & propose mechanisms
Verify theory & relate to Mil specs
Preparation & submittal Phase II Test Plan
Coordinate test plan
Interim Reports
Note: Monthly progress repts. due
Prepare final report

APPENDIX D

DEVELOPMENT OF HIGH SPEED MARINE VEHICLE DESIGN DATABASE

GCRMTC PROJECT NO. 10

Principal Investigator: **Robert Latorre**
Department of Naval Architecture and Marine Engineering

Additional Researcher: **Paul Herrington**
Department of Mechanical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: This project addresses the lack of necessary data for selecting an efficient and economically priced high speed marine craft. The project emphasizes the development of required design standards and database methodology for systematic studies focused on the design of efficient and economically priced high speed marine transport craft. Presently these craft are being developed in Northern Europe and the Pacific Rim countries. With the weakening of the US dollar, there is a developing market niche for US shipyards to competitively market these craft worldwide. The project also includes design and procurement of unique ship structures testing equipment required to test designs based on advanced lightweight materials.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$495,853 (Year 1)
FUNDS REMAINING	$435,000 (Year 1)

ACCOMPLISHMENTS THIS PERIOD:

Task I – Survey of state of the art completed. This includes:

1. Completion of high speed marine vehicle data base program organization.
2. Entries of 450 recreational (22-75 ft.) and 100 commercial catamaran vessels into data base.
3. One technical paper written for 3/30/95 SNAME meeting.
4. Draft of technical report

Task II – Domestic/Overseas shipyard visits:

1. Domestic shipyard technical meeting with Swiftships (Morgan City, LA) and Trinity Marine (Gulfport, MS).
2. Overseas visit to Australian yards organized for 4/5 - 4/20/95.

Task III a). – Catamaran design rules:

1. Rules for acquiring good hydrodynamic catamaran hull geometry under developement.
2. Catamaran loading calculations begun for design.
3. Development of requirements for test frame equipment.

Task III b). – Proposal development:

1. Proposal with Swiftships submitted to ARPA/MARITECH program 2/14/95.

Task V – Preliminary structures testing:

1. Bid specification for test equipment completed.

PROPOSED ACTIVITIES NEXT PERIOD:

Task I – Survey of state of the art:

1. Complete and submit technical report based on Task I, II, and III.

Task II – Domestic/Overseas shipyard visits:

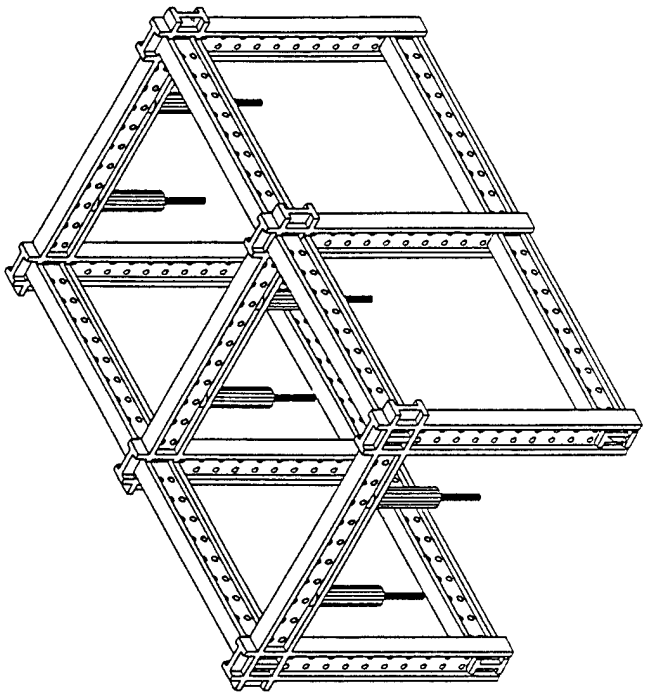
1. Travel to Australian shipyards to discuss strategies for lightweight catamaran structural design and test equipment use.

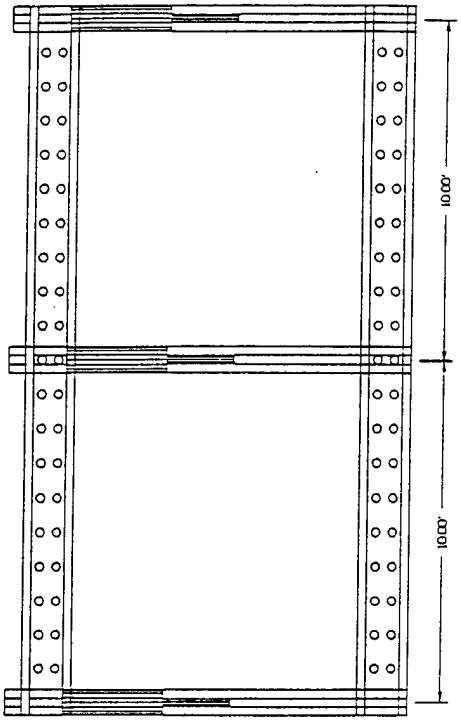
Task IV – Development of CIM strategy for proposed ship:

1. Coordinate with Swiftships (Shipyard 21 Project) on development of computer integrated manufacture of composite/aluminum catamaran hull structure.

Task V – Preliminary structures/hydrodynamic testing:

1. Design of experiment for model towing tank test/structural loading test in conjunction with shipyard input.

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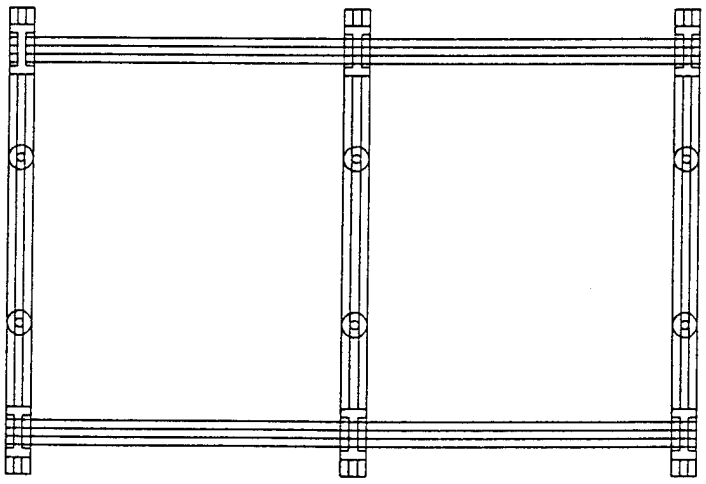

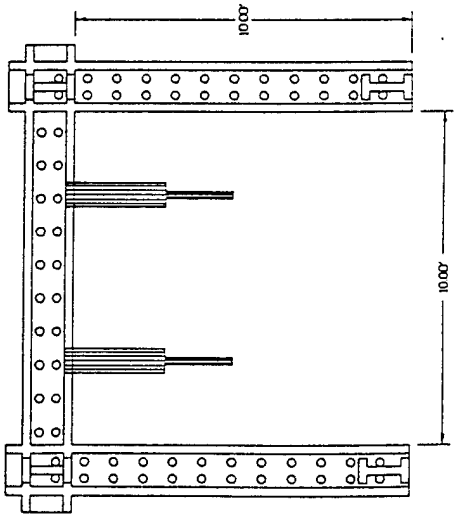
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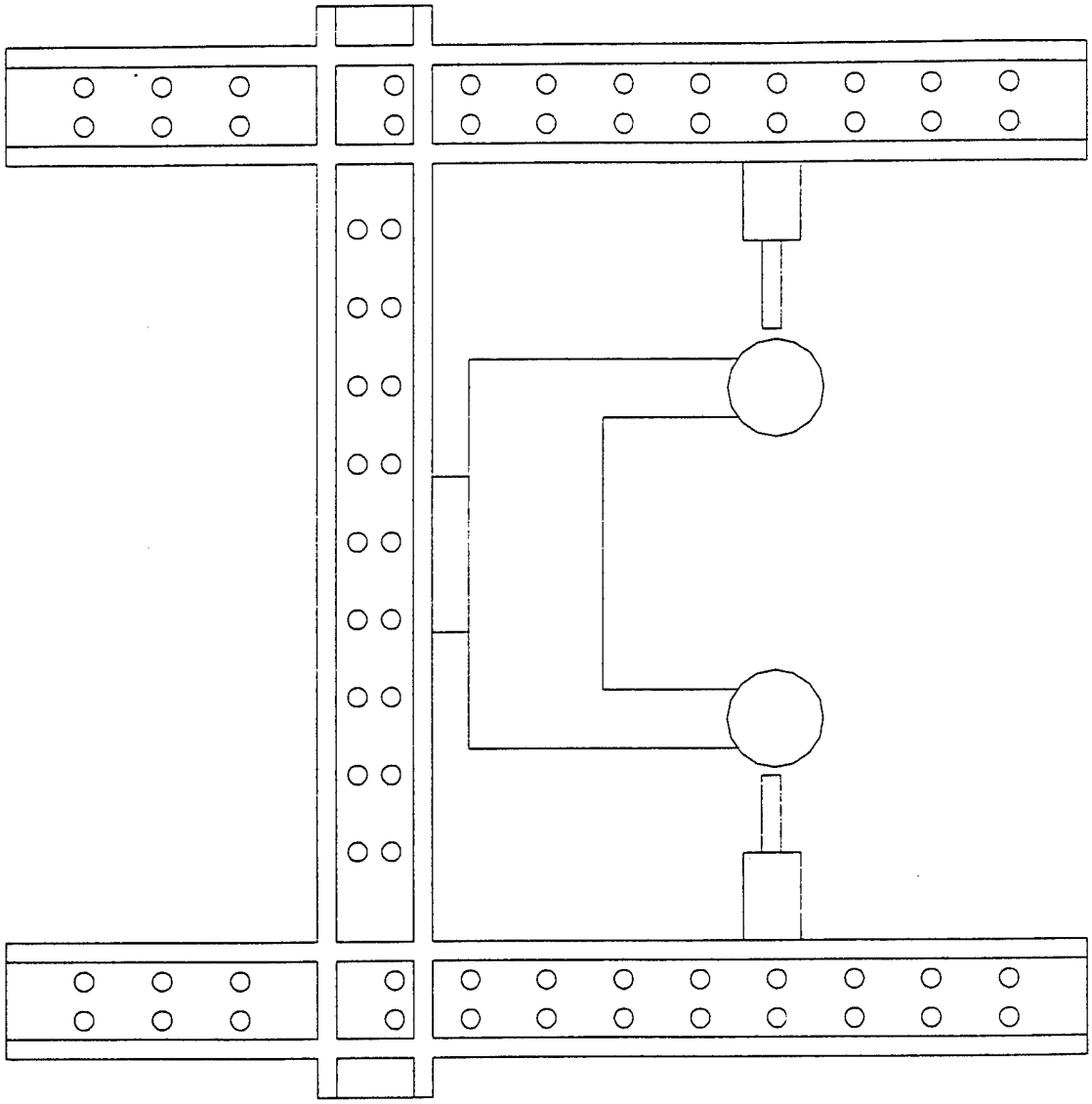
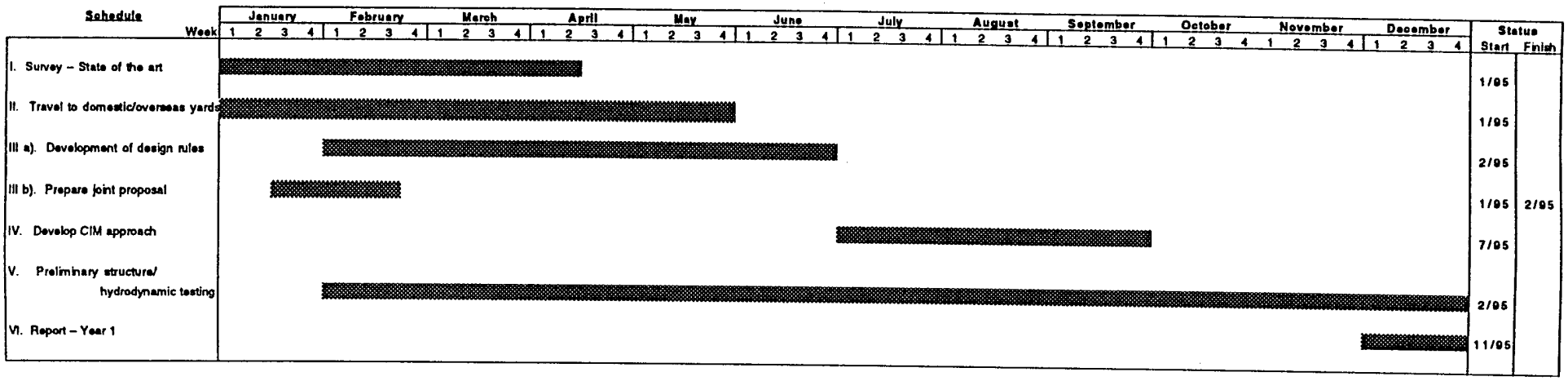


Development of High Speed Marine Vehicle Design Database



APPENDIX E

APPLICATIONS OF INTEGRATED OPTICAL FIBER SENSOR SYSTEMS IN SHIPBUILDING AND SHIPBOARD MONITORING

GCRMTC PROJECT NO. 14

Principal Investigator: **Shing Lee**
Department of Electrical Engineering

Additional Researcher: **Rasheed M. A. Azzam**
Department of Electrical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: We propose a novel fiber-optic-sensor system based on in-line photopolarimetric measurements using D-shape fibers to address the performance and cost issues. The system is compact, sensitive, and can be multiplexed throughout the ship to provide hazard warning, pollution monitoring, processing monitoring, etc. With the use the D-shape fiber, the sensor head is integrated to improve the compactness and reliability. This work is to investigate the applicability of shipboard monitoring using such a fiber optic system.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 192,039
FUNDS REMAINING	$ 119,684

ACCOMPLISHMENTS THIS PERIOD:

1) Because of the bidding process, we've experienced some delay on getting the HP Lightwave Polarization Analyzer. However, the bidding process is closed; the U.S. Department of Navy have approved; and the purchase Order has been sent. We expect the polarization analyzer here shortly.

2) A new method of analyzing fiber optic sensors has been found and the results are to be submitted to Journal of Optical Society of America A (see enclosure for a copy of the manuscript). We are currently investigating the evanescent fiber sensors and directional coupler using D-shape fibers.

3) We successfully obtain good cleaved surfaces and couple sufficient power into the small D-shape fiber. We have been contacting many fiber optic companies in obtaining the technology to build the sensors.

PROPOSED ACTIVITIES NEXT PERIOD:

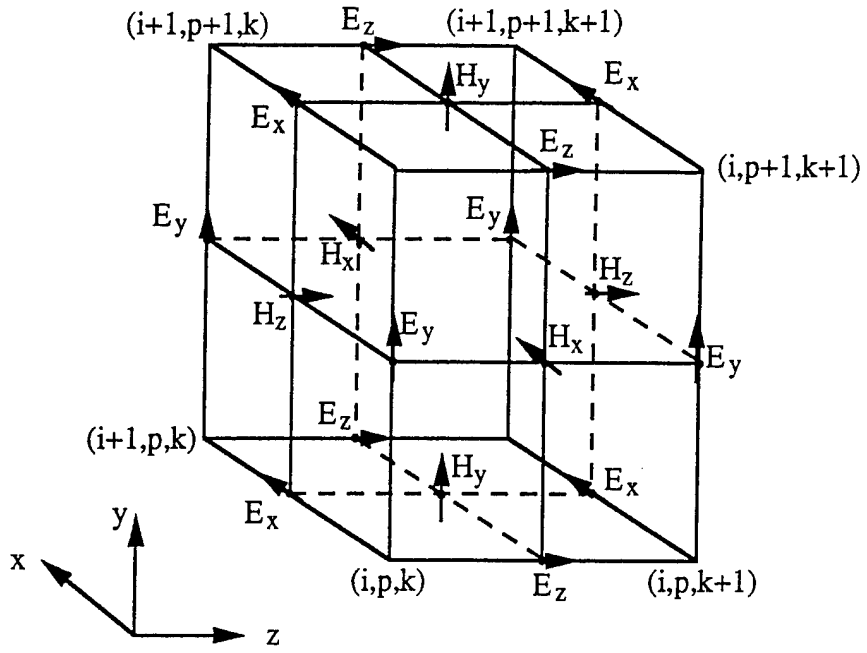
1) Preliminary investigation of D-shape fibers will be conducted. As soon as the Polarization Analyzer arrives, the effects of fiber twisting on the state of polarization will be studies in detail.

2) Evanescent absorption sensors using D-shape fibers will be investigated. Use the new found method to aid the design of such sensors. Prototype sensors will be built and

tested. We will specifically study their applications in detecting oil leaks, fuel level, pollution and flooding.

3) Distributed fiber sensor networks for temperature and pressure will be investigated. Specifically, the in-line Fabry-Perot interferometric distributed sensor seems to fit the Navy's requirement for a rugged sensor system. Discrete sensors of this type can operate continuously from -200°C to 1050°C.

4) We will be consulting with shipbuilders for their input on the design fiber sensors and arrange tests aboard ships.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Ez
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Ez
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Hz
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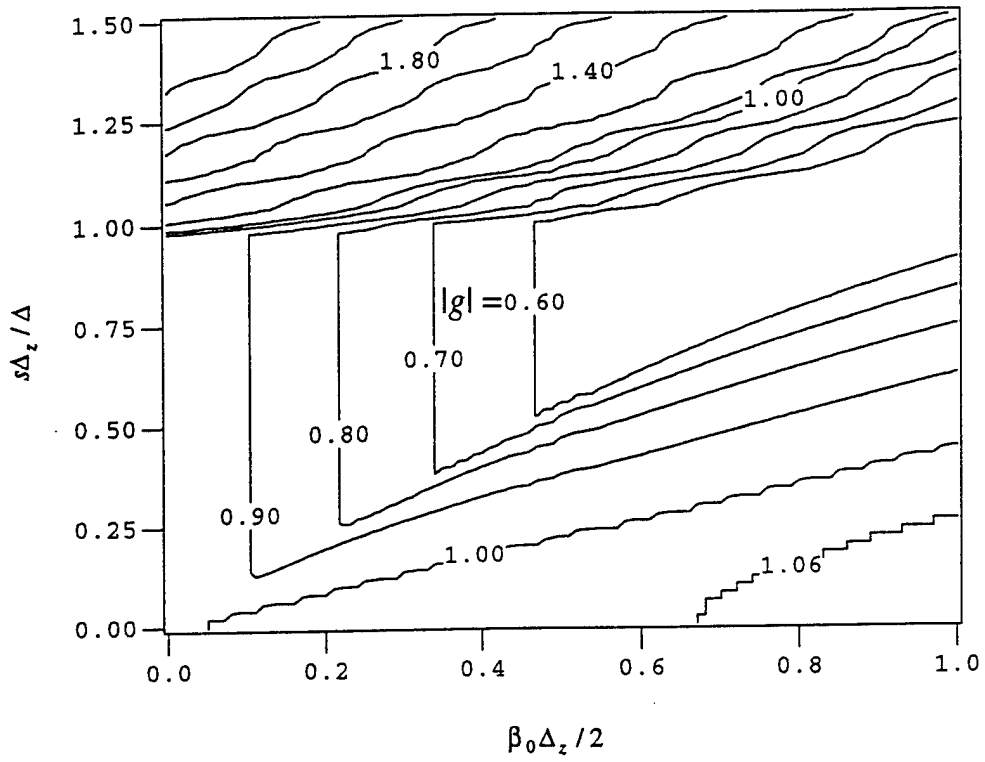
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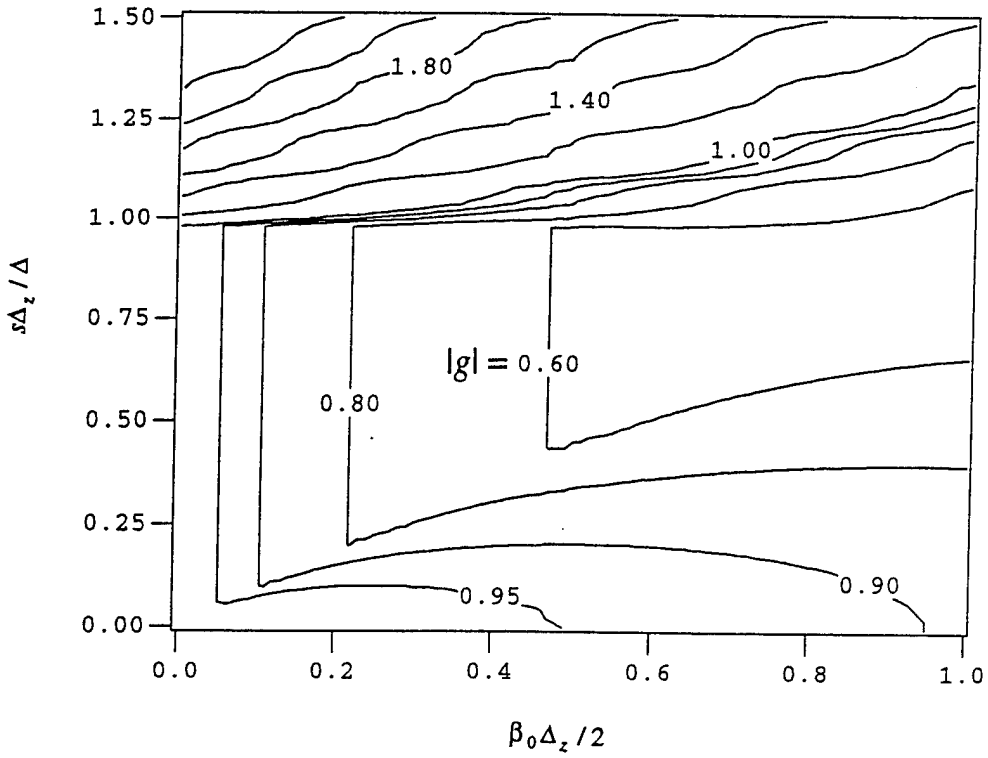
(a)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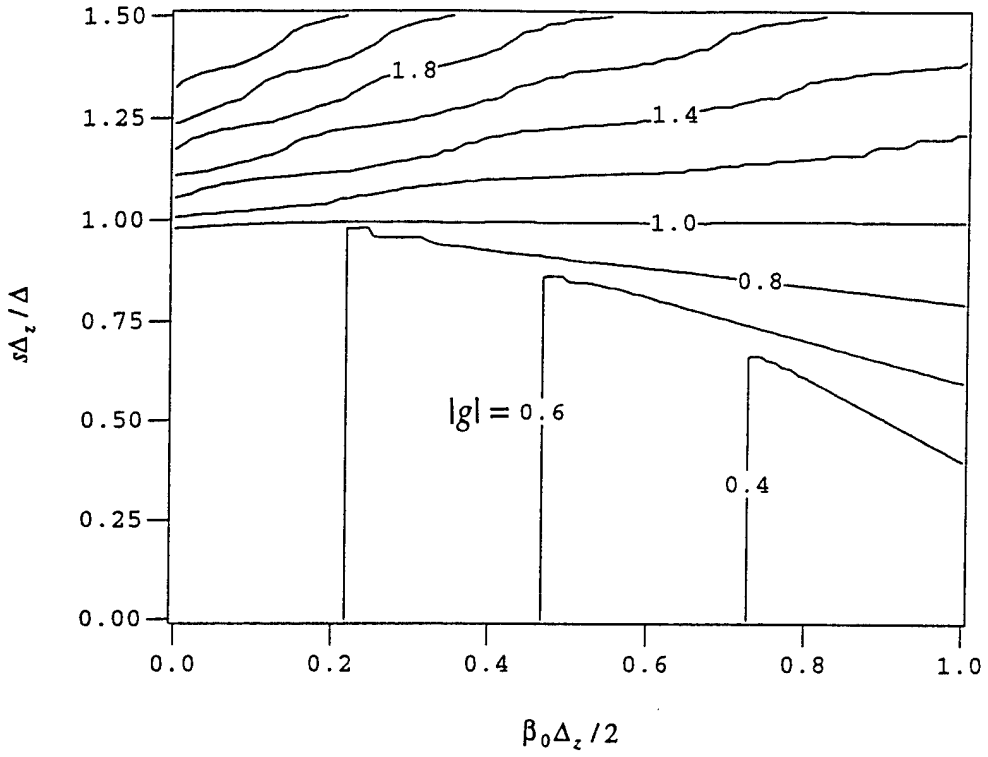
$\beta_0 \Delta_z / 2$

(b)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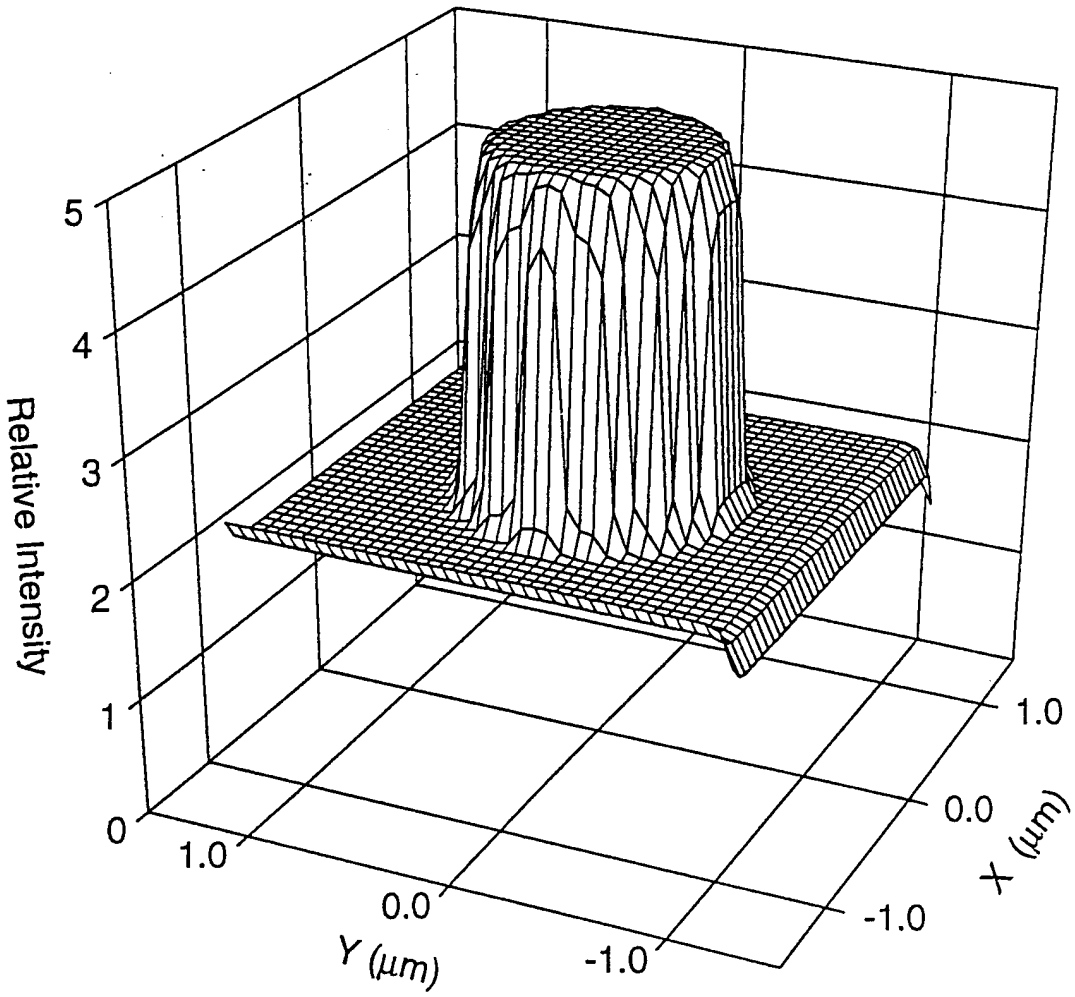
sΔz / Δ
β0Δz / 2

(c)



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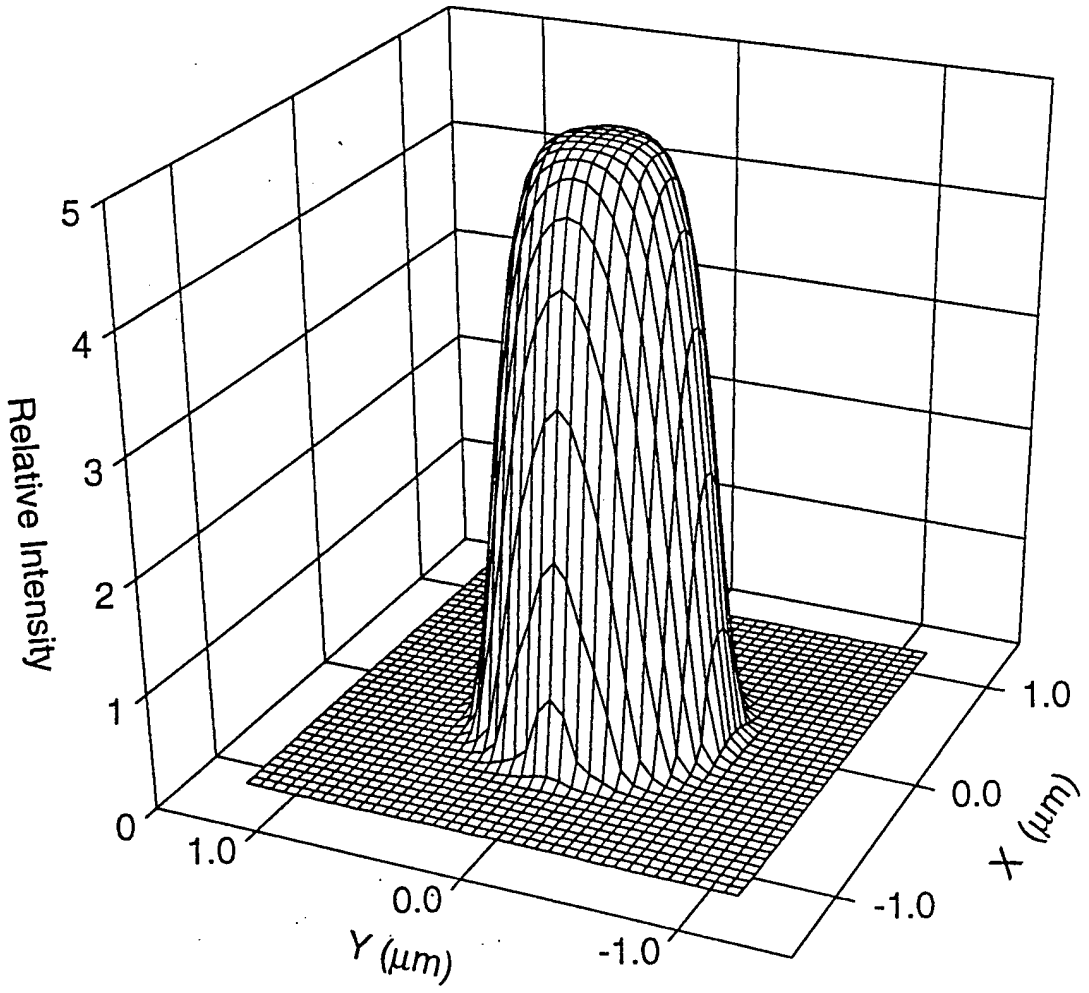

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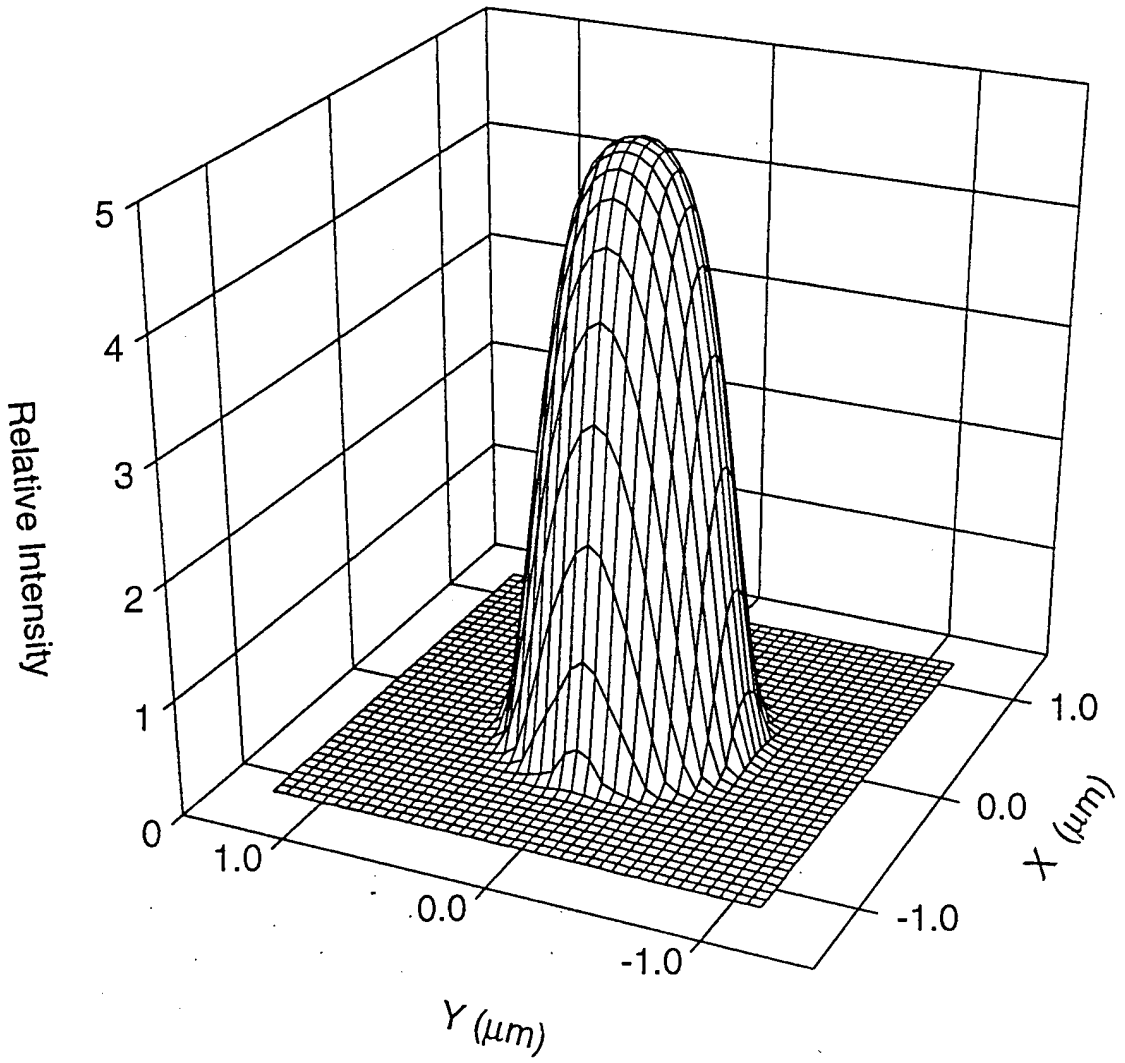

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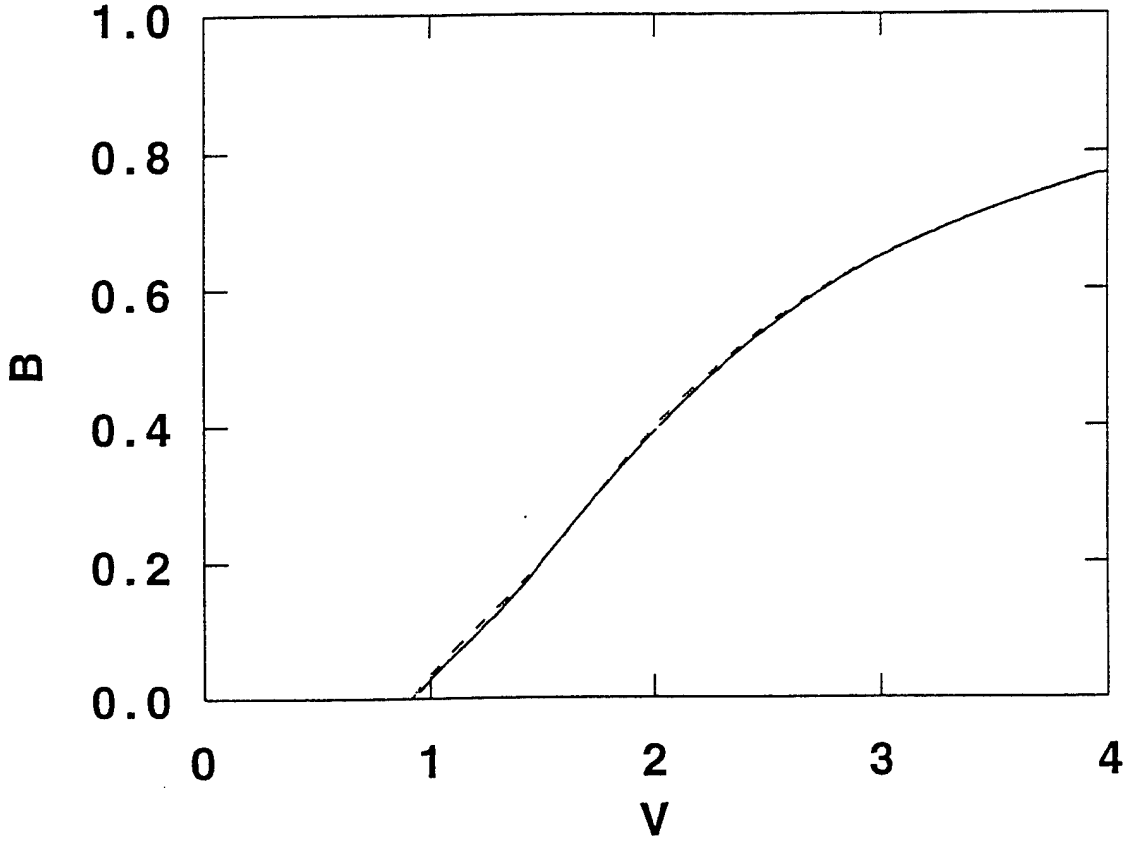
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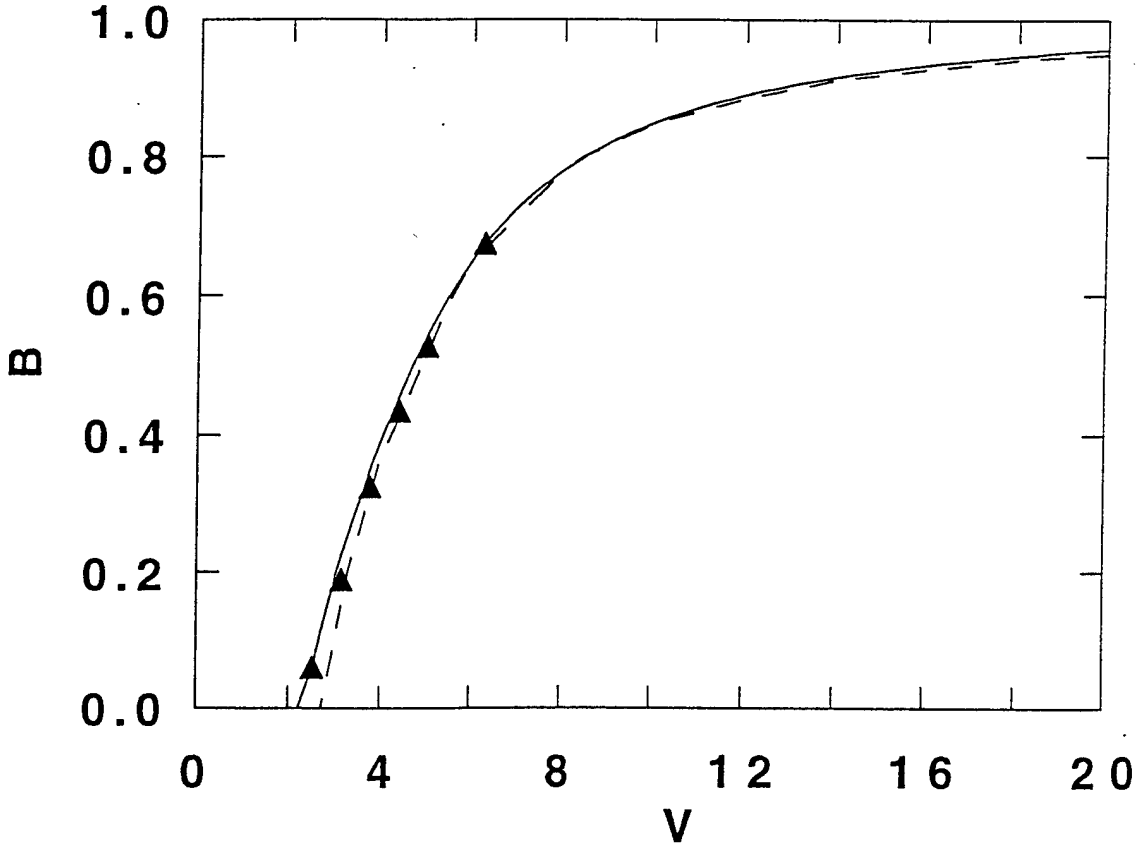
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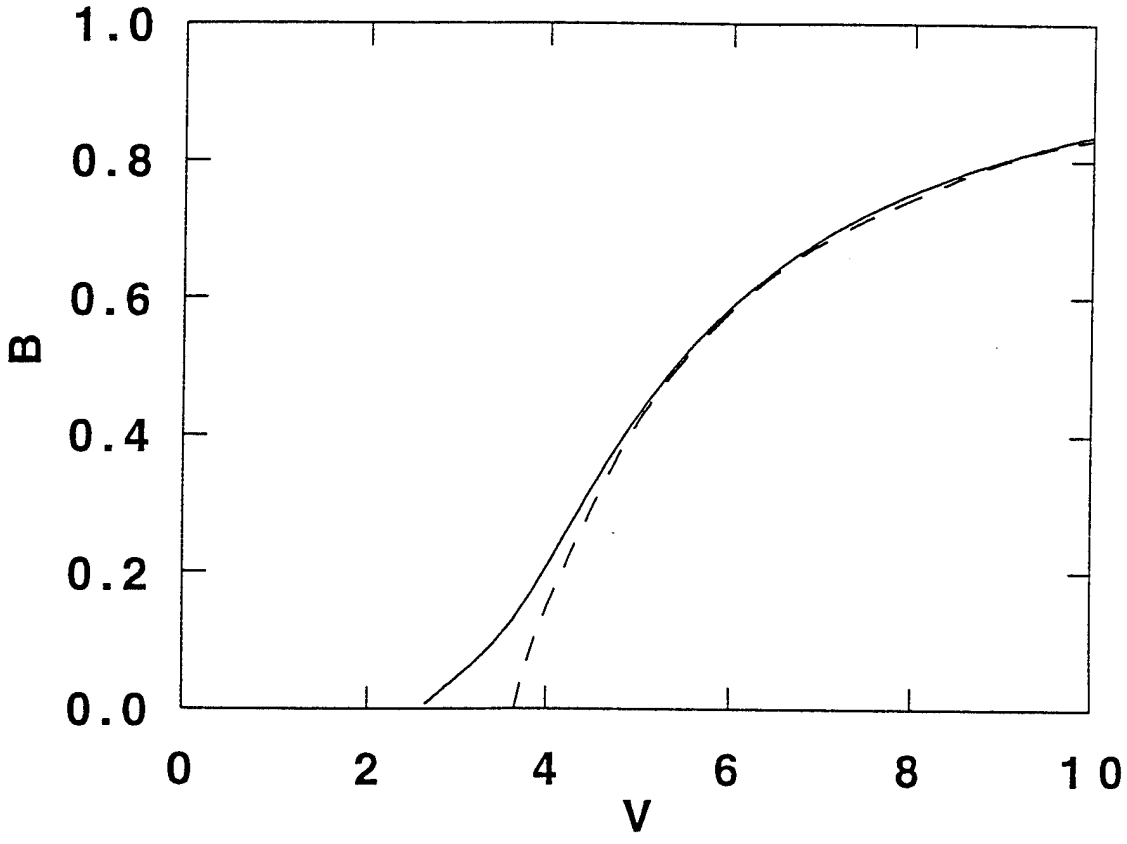
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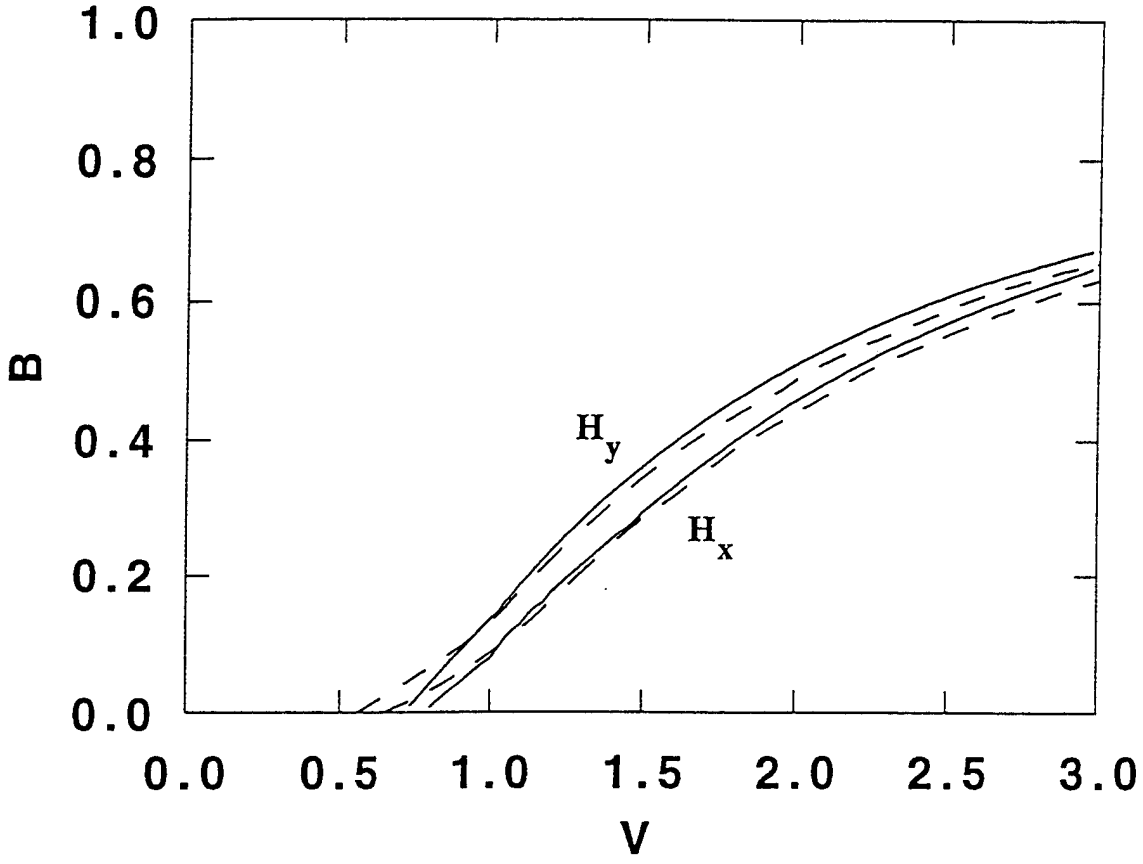
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0.8
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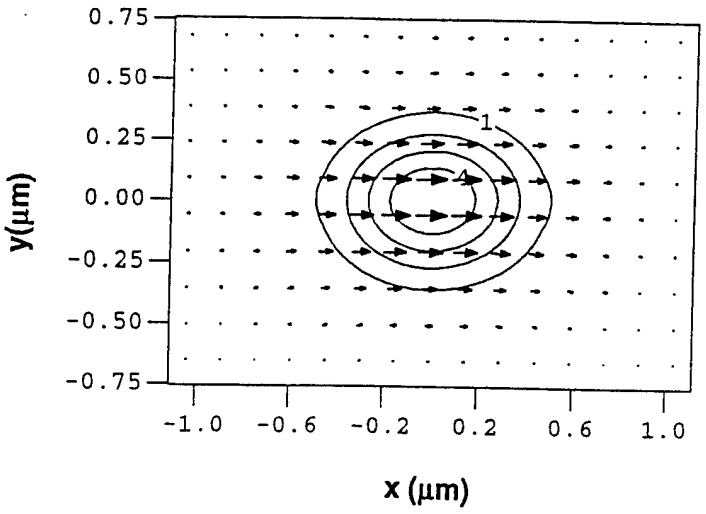
V
H_y
H_x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-0.50
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-0.2
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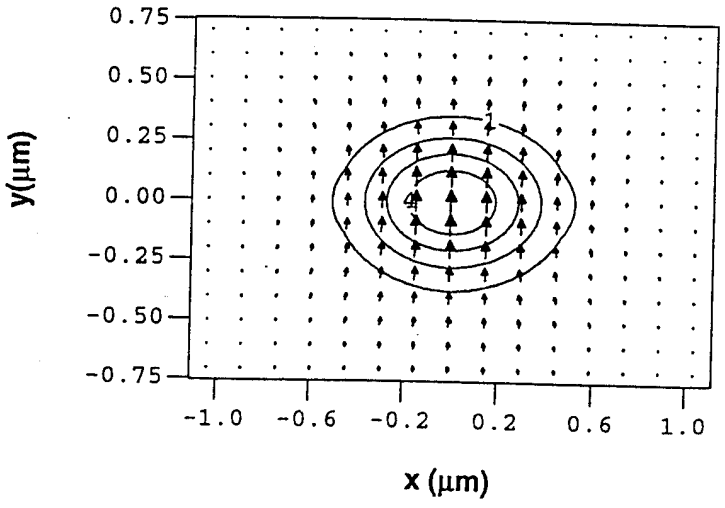
0.6
1.0
x (μm)
1
4

(a)


0.75
0.50
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y(μm)
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0.6
1.0
x (μm)
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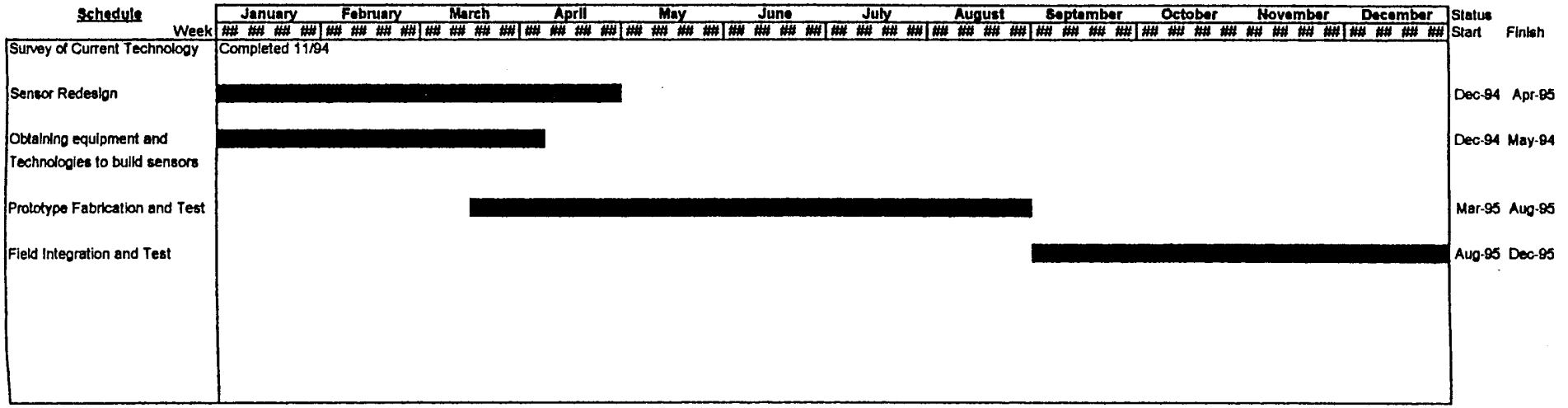
4

(b)

Shipboard Sensors



APPENDIX F

HIGH EFFICIENCY HIGH POWER DENSITY MOTOR DRIVES FOR MARITIME APPLICATIONS

GCRMTC PROJECT NO. 15

Principal Investigator: **Pragasen Pillay**
Department of Electrical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: Permanent magnet (PM) motors have been widely used in the industry for precise control applications or where high power density is of prime importance like on robot arms or aircraft generators. The higher power density of PM motors imply that they occupy less space and weigh less than an equivalent induction motor. Thus the effective payload can be increased or a longer range attained with the same payload. In the meantime, switched reluctance motors have been developed which are both mechanically and thermally extremely robust, but has the disadvantage of a pulsating torque. It is proposed here to investigate the application of PM and switched reluctance motors for maritime applications with the aim of improved efficiency and reliability of shipboard systems.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 77,002
FUNDS REMAINING	$ 60,212

ACCOMPLISHMENTS THIS PERIOD:

Dr Pillay and his research associate, Raphael Samudio met with Erik Amudsen, Lamar Williams and John Major of Newport News Shipbuilding, where future collaboration on this project was discussed. They also obtained the detailed electrical drawings of a 6000 person aircraft carrier. From this, data has been gathered on the number of motors driving pumps, fans, compressors, valves, refrigerators and other loads as shown in Figure 1. Figure 2 shows the number of motors in different horsepower ranges on the carrier while Figure 3 shows the installed horsepower in each range. Figure 4 gives additional details of the number of motors in each load type category while Figure 5 gives the installed horsepower. These graphs are important in determining where the opportunities for the newer motors would be.

PROPOSED ACTIVITIES NEXT PERIOD:

The opportunities for the newer motor drives will be identified. The survey of commercial motor drives will commence and will be matched to the loads. Work will also begin on the motor characterization.

Figure 1
Population of Motors

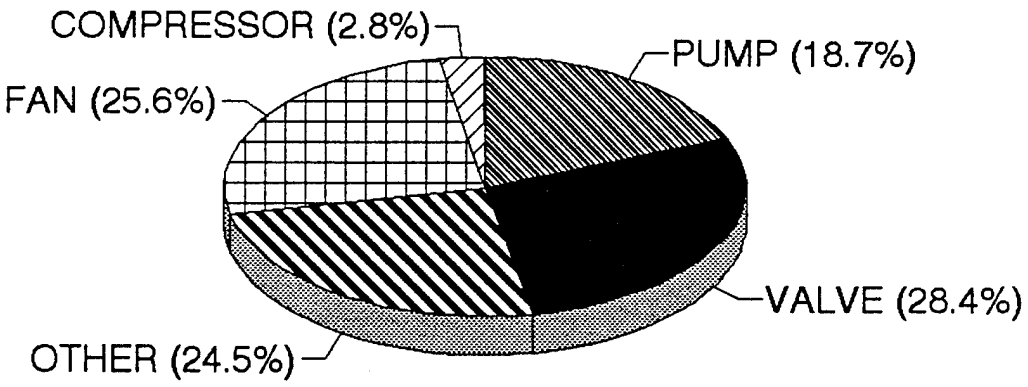


Figure 2
Quantity vs HP range

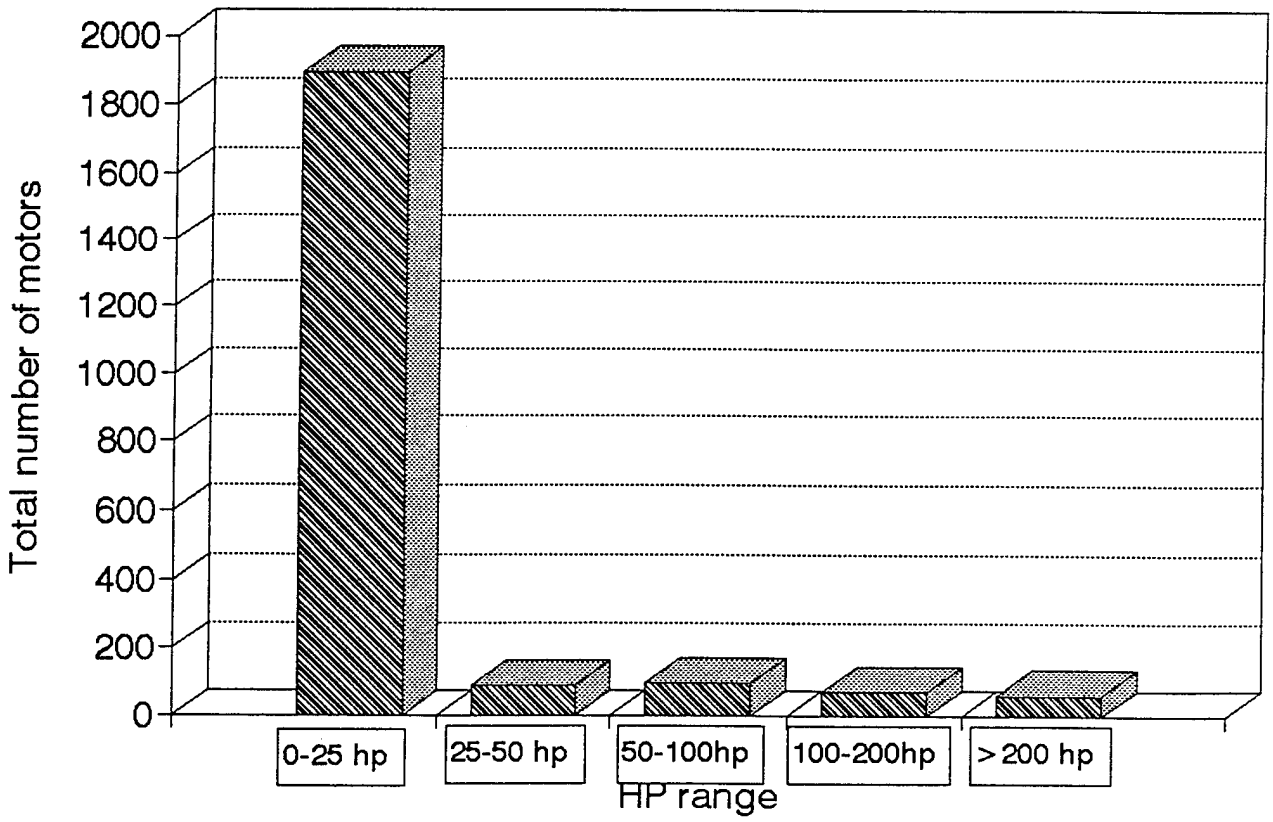


Figure 3

Total HP vs HP range

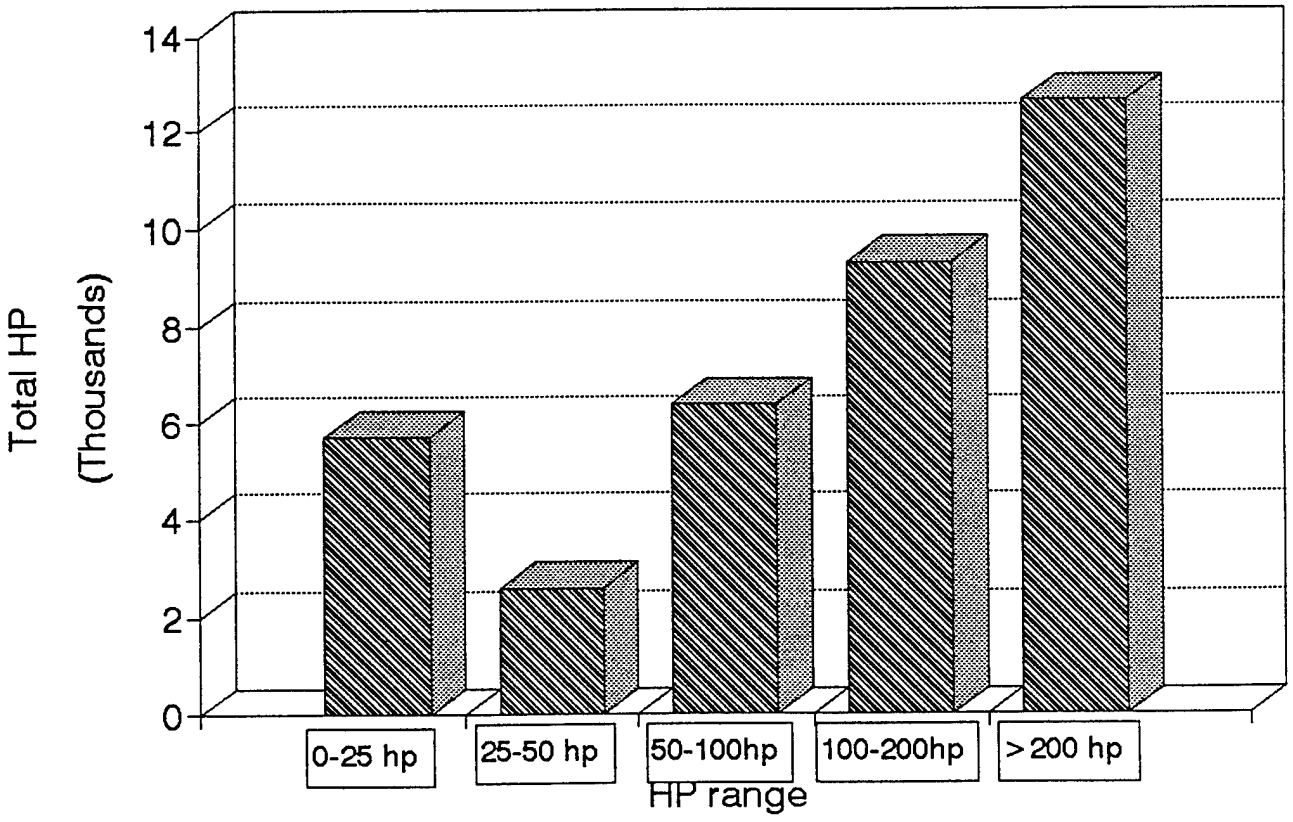


Figure 4

Quantity vs HP range for different load

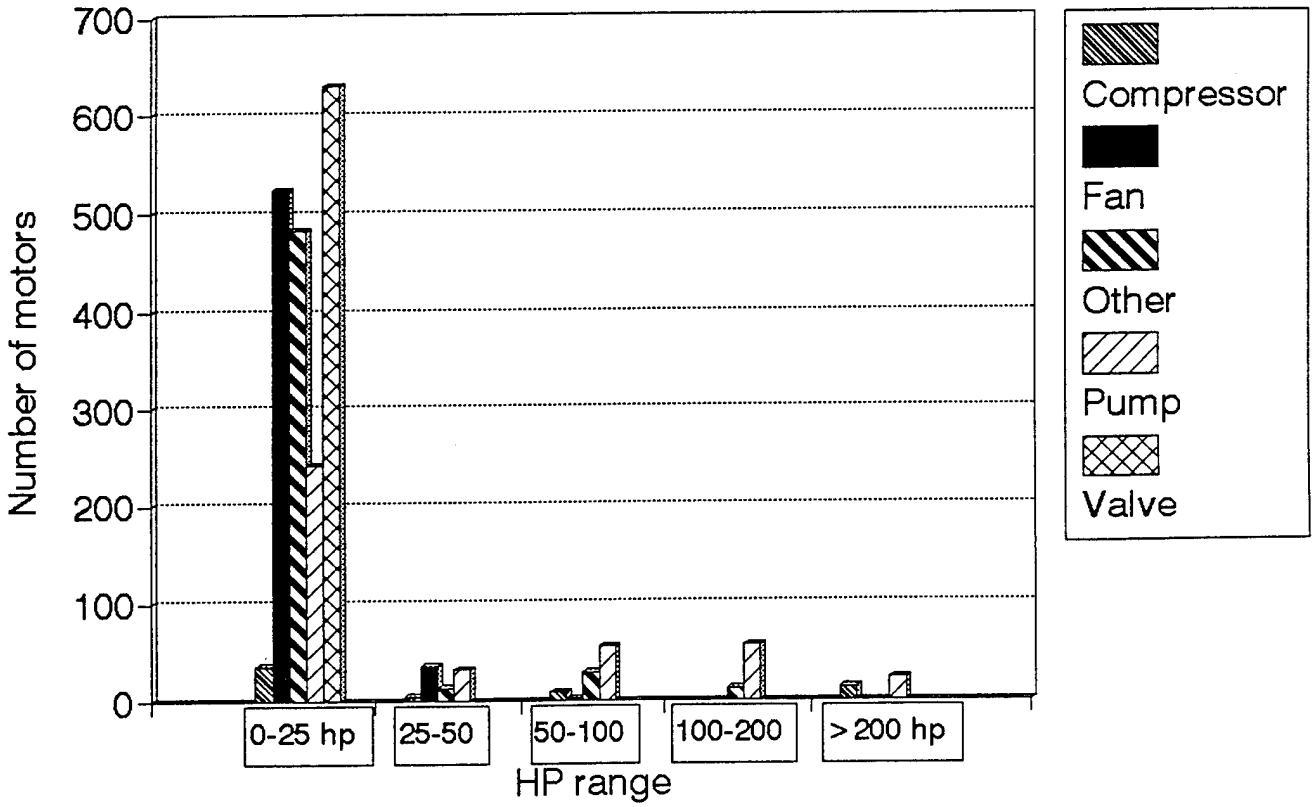
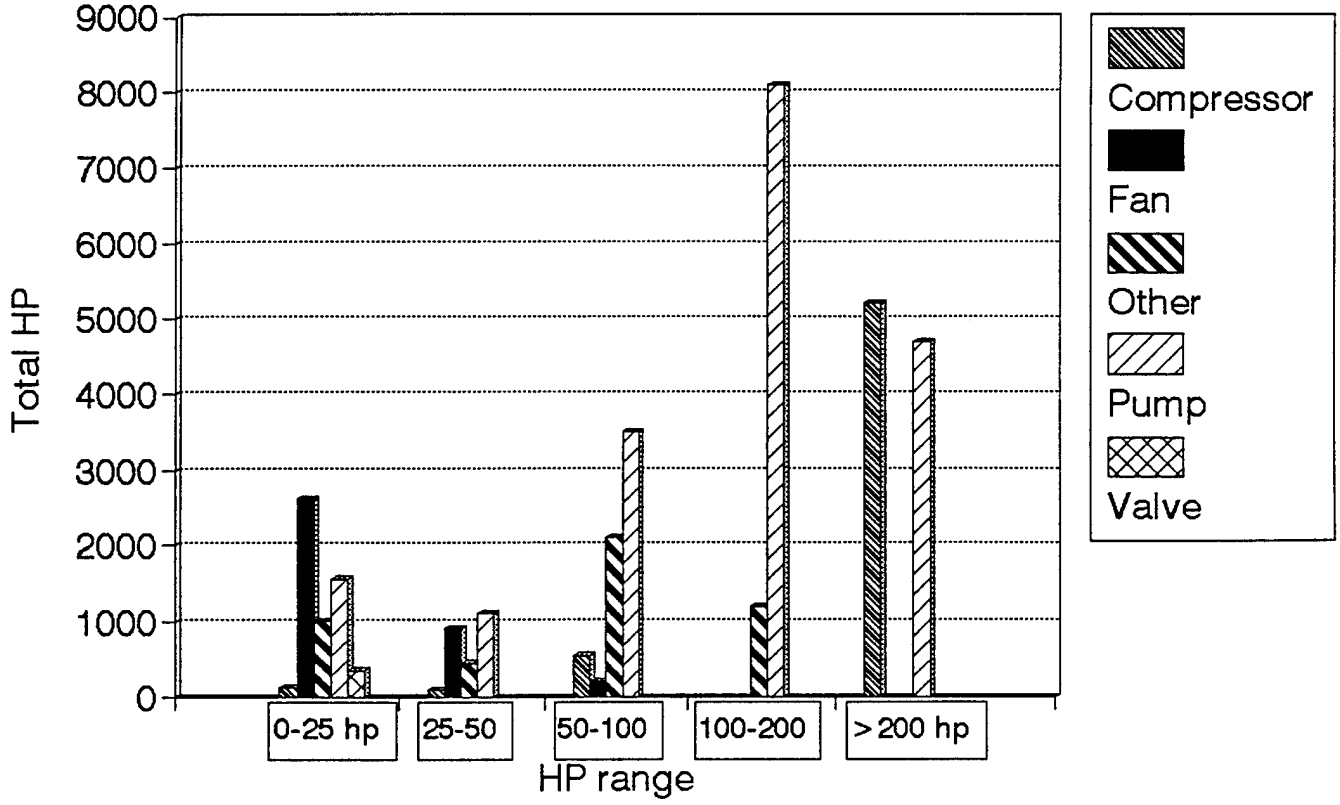
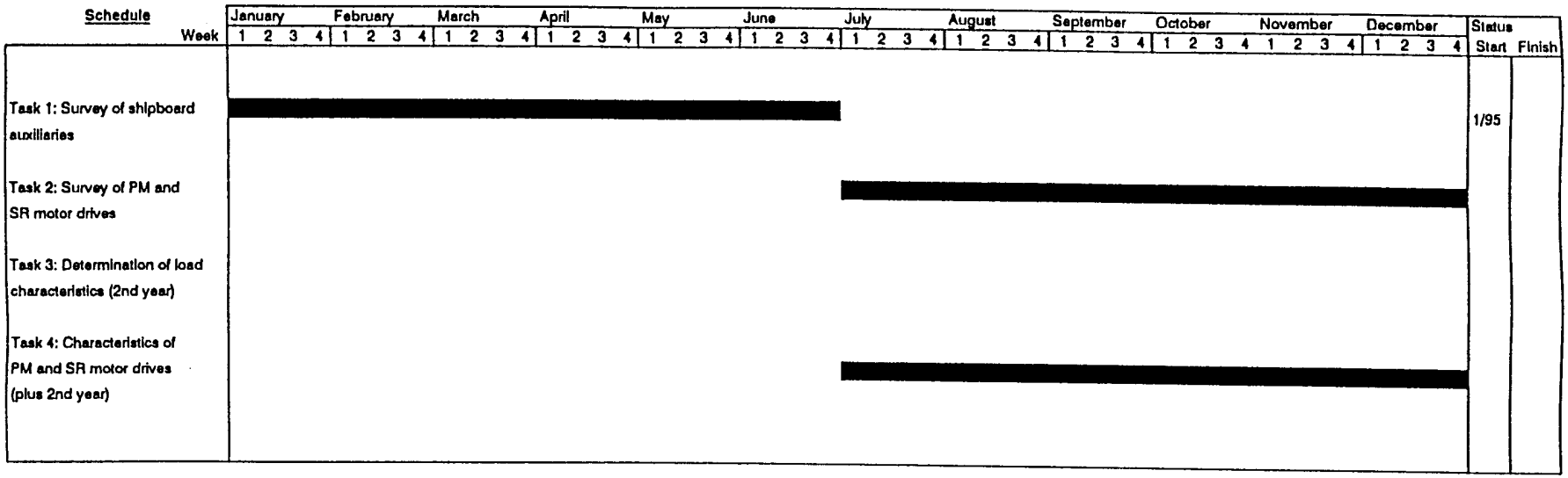


Figure 5

Total HP vs HP range for different load



High Efficiency, High Power Density Motor Drives for Maritime Applications



APPENDIX G

PROPOSAL FOR RESEARCH IN SHIPBOARD SENSORS

GCRMTC PROJECT NO. 16

Principal Investigator: **Russell Trahan**
Department of Electrical Engineering

Additional Researcher: **Robert Lipp**
Department of Mechanical Engineering
Additional Researcher: **Paul Chirlian**
Department of Electrical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: The main thrust of the first phase of this project is *Task 1: Survey of current technology*. This survey consists of a reexamination of the present US Navy requirements for sensors aboard ships and also a survey of commercial vessel requirements. This task is nearly completed. *Task 2: Sensor redesign* has been initiated along with *Task 3: Design of data acquisition system*.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 256,281
FUNDS REMAINING	$ 207,000

ACCOMPLISHMENTS THIS PERIOD:

1) Collected sensor type data and distribution statistics for US Navy combatant class CG-47, DDG-51, and LHD-1.

2) Held meeting with Ingalls Shipbuilding to verify information listed in item 1.

3) Acquired documents containing federal regulations and maritime requirements for sensors aboard commercial ships.

4) Held meetings with Trinity Shipbuilding and McDermott Shipbuilding to discuss sensor placement concepts.

5) Initiated contacts with commercial sensor vendors who supply monitoring systems for shipboard applications.

6) Visited casino gaming vessel while under construction to view monitoring systems.

7) Have begun development of circuitry and purchase of parts for optical transmitters and receivers.

8) Developed requirements for A/D-D/A interface board to be used in computer system.

9) Began redesign of smoke detector based on commercial design.

PROPOSED ACTIVITIES NEXT PERIOD:

1) Complete commercial sensor system type and distribution statistics.

2) Complete redesign of existing US Navy sensors. Develop spectifications for fabrication of sensor hardware.

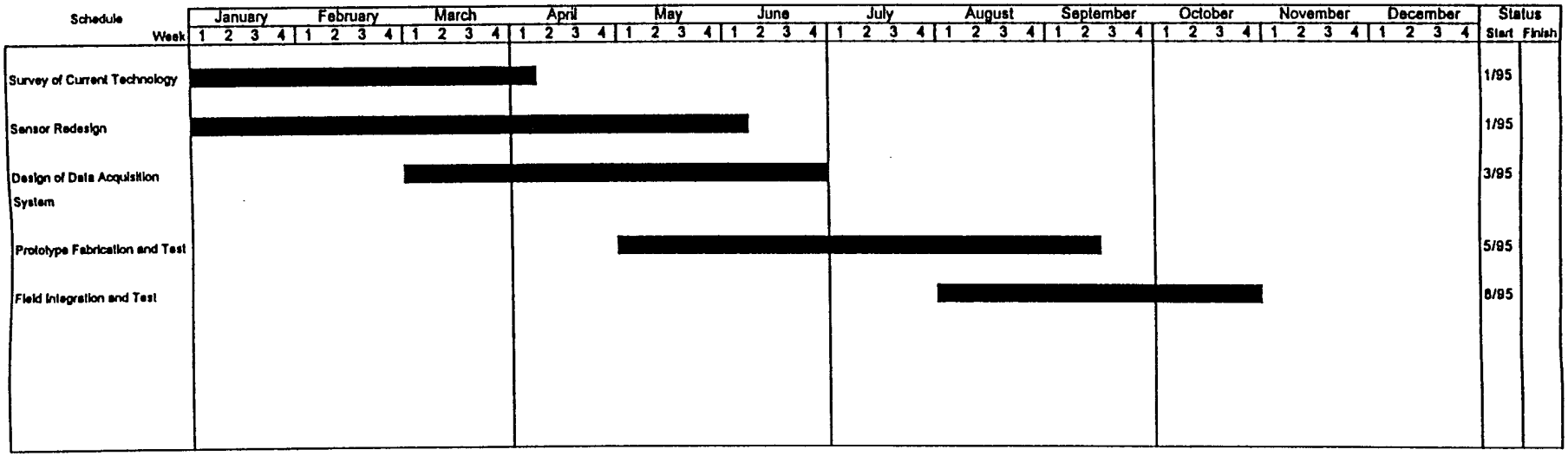
3) Complete design of optical transmitter and receiver circuits.

4) Compare US Navy sensors previously designed by UNO to proposed redesigns for commercial and military applications.

5) Selection and procurement of environmental chamber to be used for sensor testing.

6) Procurement of A/D-D/A system.

Shipboard Sensors



Updated March 22, 1995

APPENDIX H

SHIPS' RELIABILITY, AVAILABILITY, AND MAINTAINABILITY (RAM) DATABASE

GCRMTC PROJECT NO. 18

Principal Investigator: **Bahadir Inozu**
Department of Naval Architecture and Marine Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: To establish an integrated RAM database to collect, process, analyze and disseminate field data from merchant ships for new failures, to download existing ship machinery failure history data from ship logs, to access international RAM databases, to investigate reliability and maintainability of existing shipboard components, and to provide a basis for optimizing maintenance and ship building practices, increasing the reliability, safety and quality of U.S. ship operations and recommending new ship designs.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 200,583
FUNDS REMAINING	$ 195,853

ACCOMPLISHMENTS THIS PERIOD:

1) Data Entry program DATE's Beta Version 1.0 and 1.01 have been completed and are currently tested. First demonstration of DATE software took place at the SOCP executive committee meeting on January 18, 1995 at Reston, VA. At this meeting various modification requests were made regarding DATE. Name plate data from ETC and Sea-Land have been transferred to DATE for testing. Nameplate data transfer for ARCO Marine is in progress. A special demonstration and evaluation of DATE took place on February 23, 1995 at UNO. Mr. Peter Schaedel, the supervisor of the RAM database for SOCP, and Mr. Zbigniew J. Karaszewski, (MSTEP Program Manager of U.S.C.G. which is also a participant of SOCP) attended this meeting.

2) We are in the process of getting first evaluations of DATE from SOCP members to reach a consensus for data entry modifications.

3) SOCP started a membership drive. In addition to Ship operators/Ship owners, participation of shipyards and equipment manufacturers are actively solicited nationwide, especially for the RAM database project. I am in charge of coordinating shipyard participation. I made a special presentation at Avondale on March 17, 1995 about the RAM database project and the SOCP. Avondale is very interested in the RAM database project. In addition, Newport News Shipbuilding, Ingalls Shipbuilding, McDermott, NASSCO and Bath Iron Works are targeted for their participation in the RAM database project.

4) The development of the Ship Performance Review Program SHIPPER has been started.

5) We are in the process of hiring Mr. Philippe Roy as a research associate. 25% of his time will be allocated for this project. Ms. Sonya Lamb and Mr. Wes Corbett are also working as assistants for this project.

6) I had a meeting with Mr. Jim Murphy of NAVSEA regarding NIDDESC and STEP standards for ships on March 2, 1995 at Pascagoula, MS. The need to establish STEP Life Cycle Change Process Standards for Ships has been discussed in addition to various international STEP projects underway. We are currently examining NIDDESC and ship related STEP standards. I also attended the SP-4 meeting at Ingalls.

7) Development of Ship Performance Indicator program, SPIN's specifications are underway.

8) My paper titled "Reliability Data Banks and Cooperation for Ship Safety Worldwide" has been accepted for presentation at ISME'95 conference to be held at Yokohama, Japan on July 17-21, 1995. I am also preparing a paper with Mr. Peter Schaedel of SOCP titled "Networking to Improve Ship Reliability, Availability and Maintainability" to be presented at SNAME's CyberNautics'95 Conference on April 21-22, 1995 at Long Beach, CA.

9) The T&R Steering Committee of SNAME has approved the formation of SMC (Ship Machinery Committee) Panel M-41 (RAM Database). I was authorized to chair this panel. The panel's mission is " to assist and review the RAM Database projects already began" under my leadership. I will be inviting various experts to panel M-41 very shortly.

PROPOSED ACTIVITIES NEXT PERIOD:

1) Finalize the development of SHIPPER's first version and start SOCP-wide testing of the software.

2) Examine evaluation of DATE Beta Version 1.01, and implement modification requests for DATE and start testing the modified version.

3) Finalize specifications of SPIN, start developing specifications for Ships' RAM software for the master database at UNO.

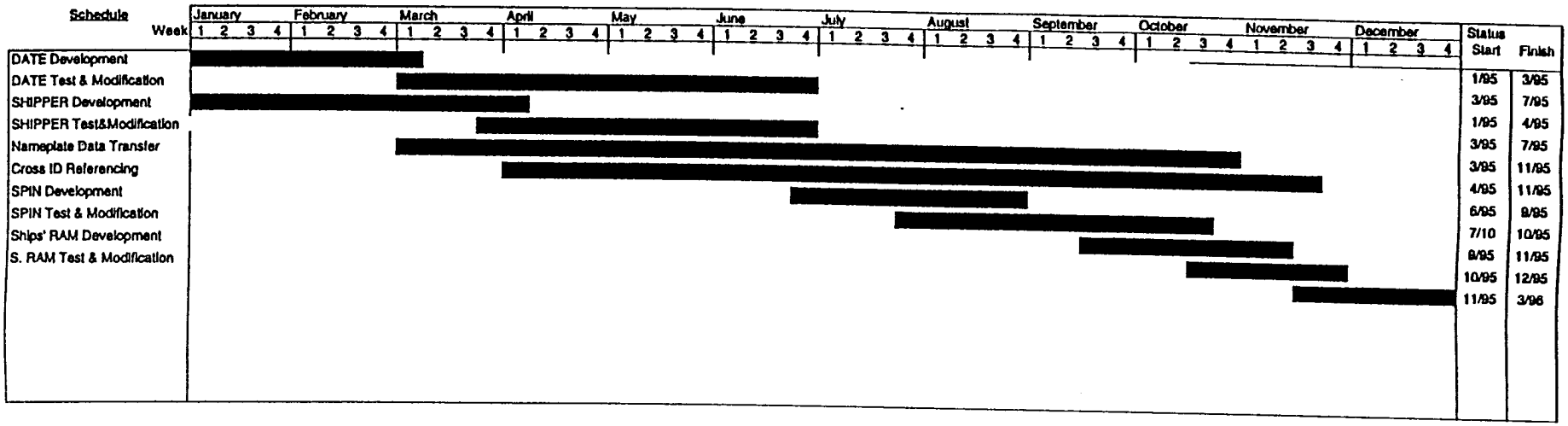
4) Hold special meetings at the headquarters of ETC, Sea-Land and ARCO Marine for database software demonstration, evaluation and feed back.

5) Attend ICMES TC-1 (International Cooperation on Marine Engineering Systems - Technical Committee on Reliability, Safety, Maintainability and Support) meeting to be held in Madrid, Spain on May 12, 1995 for the establishment of the International Ship Network for Ships' RAM data exchange.

6) Attend SNAME's CyberNautics'95 conference to present our paper mentioned above and to invite various segments of the marine industry to the RAM database project to close the experience feedback loop and to increase number of merchant ships which will be providing RAM data to our database.

7) Attend annual meeting of the SOCP to present the final report for the SOCP sponsored Phase II of the RAM database project. The meeting is tentatively scheduled for May 31 - June 2, 1995.

Ships' Reliability, Availability, Maintainability (RAM) Database



APPENDIX I

PERFORMANCE SIMULATION OF MARINE PROPULSION SYSTEMS UNDER EXTREME CONDITIONS

GCRMTC PROJECT NO. 20

Principal Investigator: **Bahadir Inozu**
Department of Naval Architecture and Marine Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: To examine the steady state and dynamic responses of the low and medium speed engines to various loads and failure modes using computer simulation. CDNSWC is primarily interested in the most frequently used types of propulsion systems on commercial cargo vessels. Three focus areas of this study are as follows:

Task 1. Examine operation in ice brash or pack ice
Task 2. Investigate extended full load operation beyond MCR (Maximum Continuous Rating)
Task 3. Examine operation with no intake air filter or with a dirty intake filter/reduced pressure in engine compartment

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 180,841
FUNDS REMAINING	$ 84,438

ACCOMPLISHMENTS THIS PERIOD:

1) I had a planning meeting at CDNSWC on January 20, 1995. After the meeting, CDNSWC forwarded several revisions and amplifications of the original work description as follows.

CDNSWC selected an approximately 10,000 BHP low speed engine and a medium speed engine with a BHP (Brake Horse Power) rating corresponding to an approximately 10,000 SHP (Shaft Horse Power) drivetrain for the simulation modeling. Initial emphasis will be on the low speed engines.

The maximum torque-rpm relation for each model has been identified as the priority area.

We were asked to explore the capabilities of UNO/ECN and MERLIN Codes to accommodate up to 2 minutes of ice loading.

CDNSWC is attempting to collect and forward more realistic ice-load data. Current projected availability of this data is the end of March.

A limited study of the effect of drivetrain inertia changes on engine response will also be conducted. CDNSWC will provide variables, ranges, and a description of variations to be investigated.

I was asked to explore the possibility of obtaining the limited services of Dr. Larmi of the Helsinki University of Technology for the purpose of making a comparison between the results of the UNO/ECN and MERLIN engine responses to several representative ice-loads with those response results from Dr. Larmi's low-speed engine drivetrain code.

2) UNO/ECN code has been updated to get more precise results for the transient response of medium speed diesel engines. Preliminary runs were made for the initial ice loads provided by CDNSWC for the Pielstick PA 6-280 engine using this updated version named SIMBAD.

3) Preliminary restructuring of the UNO/ECN code to model a low speed engine has been started.

4) Pielstick PC 4.2 engine data has been loaded to the UNO/ECN code. Currently, this code is tested for the PC 4.2 engines. Additional engine data was requested from Colt-Pielstick which agreed to accommodate our new data request.

5) The first results regarding the torque-rpm characteristics for the PA 6-280 engine were forwarded to CDNSWC. Currently, CDNSWC is preparing various ramp functions for more runs.

6) A meeting was held with Mr. Greg Gutoski of Colt-Pielstick at UNO on February 23, 1995. Mr. Gutoski agreed to provide engine test data to verify simulation results.

7) A meeting was held at UNO with Mr. J.S. Carlton, Senior Principal Surveyor of the Technical Investigation, Propulsion & Environmental Engineering Department of Lloyd's Register on March 10, 1995. We discussed various details regarding the MERLIN software, it's licensing agreement and possible areas of cooperation.

8) Lloyd's Register provided a confidential report on their Marine 2-Stroke Diesel Engine Simulation Model. This report includes confidential data from MAN B&W.

9) Two SUN SPARC 20 workstations have been arriving at UNO since March 10, 1995 in pieces. These computers were assembled on March 22, 1995.

10) Purchase order for the two copies of MERLIN software was issued on January 18, 1995. Lloyd's Register sent us a draft of their licensing agreement on March 9, 1995. All major problems regarding various articles of the draft licensing agreement were solved with the exception of the jurisdiction article. On March 21, 1995, the purchasing department of UNO refused to accept the new article for jurisdiction proposed by Lloyd's Register on March 20, 1995. The purchasing department of UNO does not accept the arbitration paragraph of this article. On March 27, 1995, Lloyd's Register accepted UNO's suggestion to leave the jurisdiction article silent, i.e. completely deleting the article. Unexpected delays in the acquisition of MERLIN are forcing some changes in

our work plan . Lloyd's Register reduced their maintenance fee to 10% of the full license fee starting with the second year. Maintenance will be free for the first year.

11) Paper work is in progress to hire Mr. Philippe Roy as the research associate. Mr. Roy will be spending 75% of his time on this project. Mr. Roy is expected to arrive at UNO around April 1, 1995 from France.

PROPOSED ACTIVITIES NEXT PERIOD:

1) Install MERLIN at UNO and CDNSWC, and start testing MERLIN for about a month.

2) Start examining the engine responses to the new ice loads to be provided by CDNSWC using both MERLIN and UNO/ECN codes.

3) Develop the lugging full-fuel characteristics for the selected engines.

4) Compare simulation results with test bed data for validation.

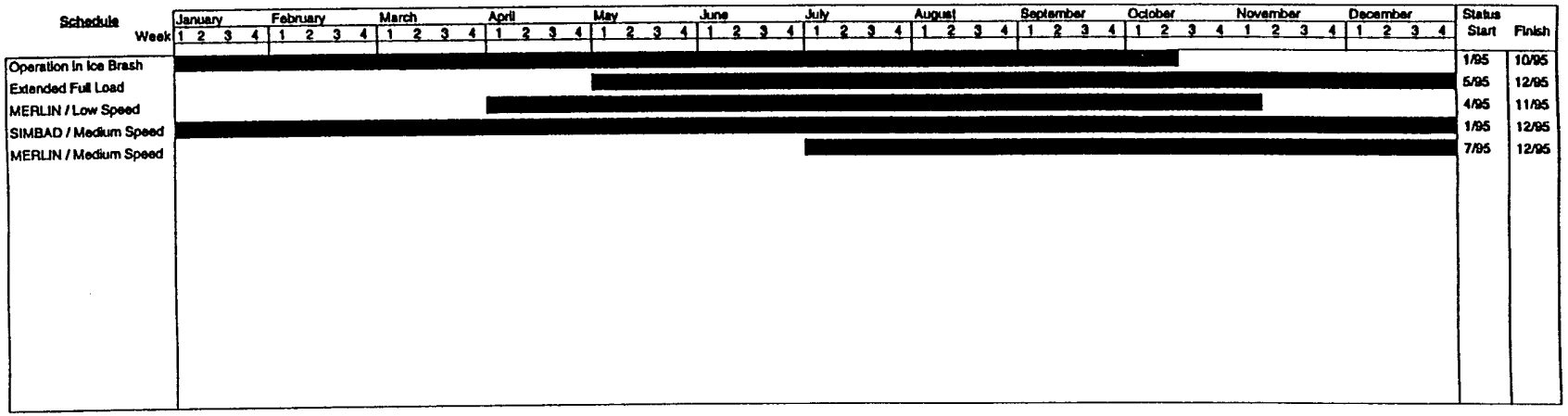
5) Arrange a training and analysis meeting with CDNSWC, Dr. Kian Banisoleiman of Lloyd's Register and Dr. Jean-Francois Hetet of ECN at UNO. This meeting is expected to take place in early May or June 95.

6) Explore participation possibility of Dr. Larmi for the analysis and comparison of the results with his code for the low speed marine diesels as requested by CDNSWC.

7) Finish the paper work for the participation of Dr. J.F. Hetet of ECN, France as consultant/subcontractor . (Office of Research of UNO now requests subcontracts for consultants). Involvement of Dr. Hetet was stated on page 3 of the original proposal. We have been developing the UNO/ECN code (now called SIMBAD) for steady state and transient response simulation of marine diesel engines as a result of the Cooperative Research Agreement between UNO and ECN. Dr. Hetet was also instrumental in getting confidential Piestick Engine data for us. Piestick engines are developed in France and they are manufactured in the U.S. under license by Pielstick in Beloit, Wisconsin.

8) Present two papers at ISME'95 conference titled "Marine Diesel Simulation for Optimum Operation and Fault Diagnosis" co-authors J.F. Hetet and P. Roy and "An ACSL Simulation Program for Optimizing the Bypass Sections of a Two-stage Turbocharger for a Marine Diesel Engine" co-authors J.F. Hetet and P. Chesse. ISME'95 conference will be held at Yokohama, Japan on July 17-21, 1995.

Performance Simulation of Marine Propulsion Systems under Extreme Conditions



APPENDIX J

STUDY OF STRUCTURAL DESIGN PROCEDURES IN THE SHIPBUILDING INDUSTRY

GCRMTC PROJECT NO. 23

Principal Investigator: **Michael Folse**
Department of Civil and Environmental Engineering

Additional Researcher: **Norma Jean Mattei**
Department of Civil and Environmental Engineering

University of New Orleans
New Orleans, LA 70148

PROGRESS REPORT: The project involves a survey of the design procedures currently in use and the research and feasibility of improving these procedures using a Load and Resistance Factor Design (LRFD) (probability based) method.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 90,746
FUNDS REMAINING	$ 90,746

ACCOMPLISHMENTS THIS PERIOD:

1) Meeting with McDermott Shipbuilding; agreement for cooperation

2) Begin study of ship design research.

Reference: "Uncertainties in Stess Analysis on Marine Structures", by Nikolaidis and Kaplan. 1991.

3) Contacted Dr. Nikolaidis and discussed state-of-art in probability based ship design.

PROPOSED ACTIVITIES NEXT PERIOD:

1) Continue study of ship design and research

2) Meet with McDermott

3) Contact other researchers in the area of ship design methods.

STUDY OF STRUCTURAL DESIGN PROCEDURES IN THE SHIPBUILDING INDUSTR GCRMTC PROJECT NO. 23 FOLSE/MATTE

Schedule	January				February				March				April				May				June				July				August				September				October				November				December				Status	
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	Start	Finish
1995																																																		
Survey of existing										■	■	■	■	■																																				
Design Procedures																																																	3/95	
Evaluation of ship loading																		■	■	■	■	■	■	■	■	■	■	■	■																					
& Uncertainty																																																		
Study of Effect of LRFD																														■	■	■	■	■	■	■	■													
on Industry																																																		
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LRFD Approach																																																		
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FINAL REPORT					■	■	■	■	■																																									

APPENDIX K

SOFTWARE APPLICATIONS FOR SHIPBUILDING OPTIMIZATION

GCRMTC PROJECT NO. 27

Principal Investigator: **Norman Whitley**
Department of Mechanical Engineering

Additional Researcher: **Stephen C. Lipp**
Department of Mechanical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: This proposal calls for the investigation of current shipbuilding methodology and the incorporation of computer-based procedures in shipbuilding design and manufacture.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 179,959
FUNDS REMAINING	$ 174,529

ACCOMPLISHMENTS THIS PERIOD:

Accomplishments to this date are in five areas: 1) identifying information sources, 2) collecting literature and software information, 3) visiting shipyards, 4) attending meetings and symposia, and 5) preliminary planning of a computer-aided shipbuilding laboratory.

1) **Information sources:**

a) **NSRP documents** describing current CAD/CAM/CE practices in the shipyards. Of particular interest are NSRP 0373 (April, 1993), Assessment of Computer Aids in Shipyards\\rm, NSRP 0435 (January, 1995), Concurrent Engineering--Primer and User's Guide for Shipbuilding, and NSRP0436 (January, 1995), Concurrent Engineering-Application.

b) **NSRP Panel Meetings** (especially SP-4 and SP-8) and their documents:

SP-4 Panel Meeting in Pascagoula, MS attended. Numerous shipyard contacts established, including Bruce Bongiorni of LUO, Stephen Maguire of Avondale, Jim Murphy of the Naval Surface Warfare Center, John Burson of Bollinger Shipyard, and Ronn Besselievre of Ingalls. All contacts have proven useful in a limited context in the attempt to establish a foothold in computer-integrated manufacturing in the shipyards.

c) **ShipNet** has been made available through the world-wide web. The address is http://www.nsnet.com.

d) **Libraries:** numerous forays to the local UNO, Tulane, and Public libraries have yielded upwards of 50 relevant articles on computer-based procedures utilized in the shipbuilding industry. Graduate assistant Pinlin Zhuang has found many articles concerning Chinese and Japanese shipbuilding practices.

e) **U. S. Navy** has been contacted mainly through the Naval Surface Warfare Center at Carderock. Prospectives in software use have been supplied by Jim Murphy.

f) **Software Information**

Intergraph Corporation. Most of our dialogue has occurred with Matt Logsdon and Steve Baum. Steve Baum provided us with our first look into the CAD II standard, or the Intergraph Integrated Ship Design and Production product via a USN/Integraph video tape. On 2/3/95 Matt Logsdon, Steve Baum and two other Intergraph employees gave us an over view and demonstration of the ISDP on workstations that they had brought here. Because of the availability of this demonstration it was decided not to go to Huntsville to visit their Ship Modeling Lab at this time.

Intergraph has made a preliminary proposal to make contri butions to the Advanced Computer Lab for Shipbuilding. The dollar amount of their contribution is significant. However, their list price and maintenance fees make their systems almost unattainable.

SDRC. We have had discussion with the Structural Dynamics Research Corporation about their product, I-DEAS Master Series. This software is equivalent to Intergraph's ISDP, but has not been tailored to shipbuilding in any way. SDRC is willing to participate in the Advanced Computer Lab for Shipbuilding through their University Consortium. The dollar amount of their contribution is also significant. List price and maintenance fees have not been established.

IMSA. We have started receiving information that is packaged by the International Marine Software Associates. This software collectively represents 5 software companies and their products: Fast Ship for hull design; NavCad for propulsion design/analysis; ShipCAM4 and NC-Pyros for lofting, manufacturing and NC burning; GHS for hydrostatic stability; and Maestro for structural analysis. These are "low-end" or PC-based packages that should have wide acceptance in shipyards. List price and maintenance fees have not been established.

2) **Literature collected**:

The literature collection process has been described in subitems A, C, and D above. In the better than fifty articles obtained, one interesting note gleaned from the articles was the federal lawsuit filed against the U. S. Navy for violating procurement procedures in their awarding Intergraph Corporation the CAD-2 contract. The plaintiffs were Cordant, Inc. and FCC, two small computer firms in the Washington, D. C. area. According to the articles in our possession, the contract award was overturned. Obviously, some settlement was agreed upon which Intergraph and the Navy must abide. We have yet to discover what, if any, changes occurred with Intergraph with the filing and settling of the lawsuit. Our contacts have been tight-lipped about this up to this point.

3) **Shipyard Visits**

These visits were made in conjunction with the investigators from Project #30 (Will Lannes, Jim Logan, and Kim Jovanovich). Project #30 has a goal of moving technology and innovation through business organizations. Our emphasis is therefore a particular instance of their overall study. Part of our study is to understand the impediments to adopting computer-aided methods and techniques in the ship design and manufacturing process. We will rely on investigators from project #30 for useful and meaningful metrics.

a) **McDermott Shipbuilding Inc.** (2/20/95)---met with Mike Pearson, Mike Landon, Dick Faust and others.

b) **Trinity Marine** (3/7/95)---met with Phil Nuss, and others.

c) **Textron Marine & Land Systems** (3/20/95)---met with Thomas Lamb.

From these shipyard meetings, none of which is a large traditional shipyard, we learned that the software needs and money available for software varies greatly from yard to yard. MSI may be in a position to justify the purchase of a fully integrated, fully associative 3D product model package, but it shows little interest in Intergraph's ISDP. It seems to be interested in the TRIBON product from AUTOKON.

Trinity has no interest in a 3D product model software. In fact, it has little interest in 3D solid model software.

Textron is interested in 3D product model software and is currently investigating various packages. Tom Lamb sees as a real problem the lack of a custom front-end and back-end to such packages. Having to develop those in-house on top of paying significant money to license the package is a real problem in his view.

Mr. Lamb is an excellent source of information about the issues surrounding computer-aided design and manufacturing as well as the concurrent engineering philosophy. He does not portray the shipbuilding industry in a very positive light in its willingness or ability to incorporate 3D product modeling into its design philosophy or practice. Nor is he enthusiastic about the industry's ability to adopt concurrent engineering practices.

We also gained insight by talking with shipyard personnel that attended the SP-4 meeting. In particular, John Burson from Bollinger gave us a very different view of the NSRP and government programs in terms of their ability to help a shipyard of Bollinger's size. We will follow up with a trip to Bollinger in the coming week (3/31/95).

To summarize what we have learned from these visits: On the whole I would say that we have met with resistance and skepticism. The culture of these shipyards does not lend itself to adoption of computer-aided techniques, whether that be in design or manufacturing. For our work to be a success, overcoming the cultural problems will be pivotal.

Also, we have found that it will not be possible to sell one standard software application to this industry. The ability to absorb the current cost, initial and on-going, of product model software, and to then profit by it is not widespread. It will be necessary to pursue several levels of computer-aided design\slash manufacturing implementation. At the same time it will be necessary to pursue some standardization such that "low-end" and "high-end" shops can still communicate effortlessly.

4) **Meetings Attended**

a) **ASNE** 21st Century Combatant Technology Meeting in Gulfport, MS. (2/16/95)

Made contact with persons from Ingalls and Trinity shipbuilding. Also met with several ship outfitters who pointed out the need for standard file exchange formats so that they would be capable of doing outfitting without the standard rework and redesign phases that often accompany their manufacturing processes.

b) **NSRP SP-4 Meeting** in Pascagoula, MS. (3/1,2/95)

The contacts gained at this conference have been described in 1) B. and 3) above.

PROPOSED ACTIVITIES NEXT PERIOD:

1) **Proposed Shipyard Visits**

a) Bollinger Machine Shop & Shipyard, Inc. (3/31)

b) Ingalls Shipyard (April)

c) Avondale Industries (April)

2) **Proposed Meetings to Attend**

a) SNAME Gulf Section Annual Meeting (5/12/95) ``State-of-the-Art in Shipbuilding CAD\CAM\CIM."

b) NSRP (SP-8) Meeting (6/7,8,9/95) ``Toward World Class New Product Development: A Learing Experience Workshop on Implementation of Concurrent Engineering in Shipbuilding."

c) Marine Log Ship Repair and Marine Maintenance '95 Trade Show (3/27,28/95).

3) **Software Information**

We will continue to gather information on software of various types. We need software of several different kinds and several different capacities (and therefore price). High-end fully integrated and fully associative product model software may be within the financial reach of only a very few shipyards. There is no agreement on a vendor for this software. It will be necessary to further investigate low-end 3D solid-model software, establishing its potential in a world moving to a 3D product modeling standard through STEP.

We will seek information and perhaps participation from Parametric Technology Corporation. Their product Pro/ENGINEER is a fully integrated and fully associative product modeler. It also has a module available for importing legacy data information as well as a module for doing design for manufacture. It is to our knowledge the only product model software that includes design-for-manufacturing (DFM) capability.

We will contact Boothroid Dewhurst, Inc. (BDI), an industry leader in design for manufacture and assembly software, about obtaining their software products.

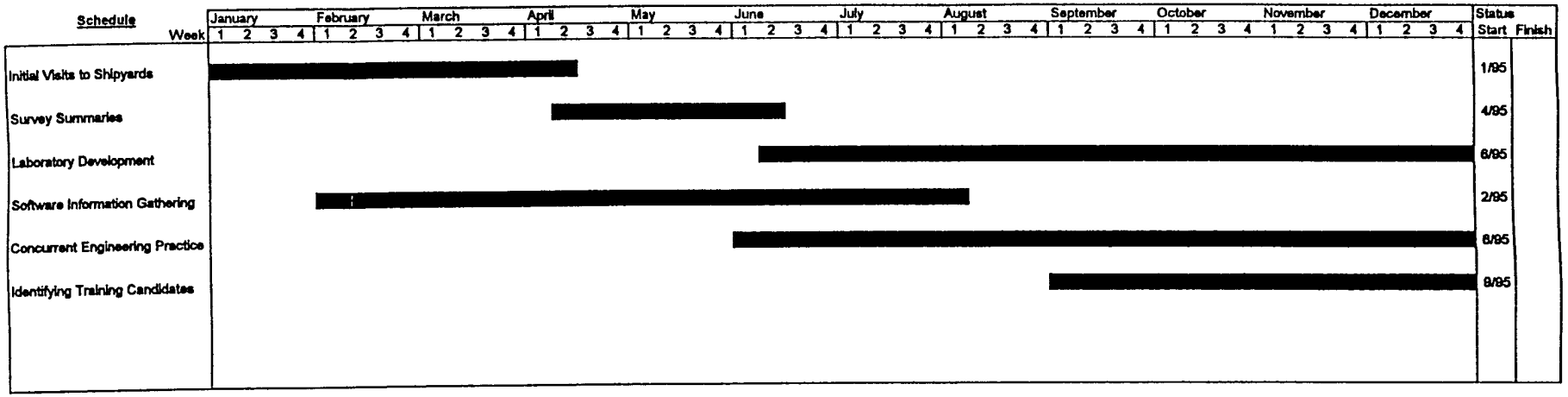
We will seek to investigate the potential of the Mechanical Applications Initiative that was recently announced by Autodesk. This initiative will make it possible for a whole suite of mechanical design and manufacturing software packages to communicate with one another using a common interface.

We will seek to identify other computer software packages that are productivity enhancing agents in the design and manufacturing processes.

4) **Lab Development**

We will establish the Advanced Computer Laboratory for Shipbuilding (ACLS) in the next quarter. A preliminary mission statement for the ACLS is included with this report. By June the goal is to have hardware and software in place to perform initial evaluations of the potential of such hardware\slash software, the need for customization, and its capacity to seamlessly integrate with other computer design and manufacturing packages.

Software Optimization for Shipbuilding (Project #27)



APPENDIX L

IMPROVING TECHNOLOGY TRANSFER IN THE SHIPBUILDING INDUSTRY

GCRMTC PROJECT NO. 30

Principal Investigator: **Will Lannes**
Assistant Dean, College of Engineering

Additional Researcher: **James W. Logan, Jr.**
Department of Management

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: The purpose of this project is to develop an improved technology transfer process for use in the shipbuilding industry. The deliverables from this project consist of an improved technology transfer process, incorporating industry best practices and current knowledge in organizational change into a matrix evaluation model, and its accompanying implementation protocol. The model will incorporate financial, technical, and behavioral factors into a normative model designed to enhance organizational technology transfer. The model will be used by firms in the shipbuilding industry to evaluate current firm practices against best practices and to identify target areas for improvement within a firm. The model will be customizable to individual firm needs to insure maximum usability. Additional benefits of this project are the generation of a current data base of literature on the subject of technology transfer in the shipbuilding industry, and increased understanding within both the College of Business and the College of Engineering of a very significant regional industry.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 127,569
FUNDS REMAINING	$ 104,656

ACCOMPLISHMENTS THIS PERIOD

General Schedule of Project Events

Q1, 1995 - Literature Review and Instrument Development
Q2-Q3, 1995 - Interviews, Surveys, and Model Prototype Development
Q4, 1995 - Q2, 1996 - Prototype Test and Improvement
Q3 - Q4, 1996 - Final Model Test, Publication, and Implementation

Project Milestone Schedule

1) Global literature review and initial interview instrument development.
2) Initial field interviews to establish validity of industry structure model.
3) Initial survey instrument development and pretest.
4) Identification of target population and survey sample.
5) Survey of sample population.
6) Analysis of initial data.
7) Development of prototype model and protocols for usage.
8) Test of prototype model in multiple field settings. The model will be tested at this stage in cooperating companies and with other GCRMTC projects in which it may prove useful.

9) Iterative steps by field interview and improvement to improve usefulness of model.
10) Establishment of final model and usage protocols.

Milestones Achieved

Milestone 1: Initial literature review from U.S. and U.K. sources completed. Literature search is ongoing for sources (from or about) Korean, Japanese, and European practices, although many practices in these countries are documented in U.S. based publications.

Primary Investigators and Consultant have made site visits, presentations, and received feedback on our proposed actions at the following sites: McDermott Shipbuilding, Ingalls Shipbuilding, Trinity Marine in Gulfport, and Textron in New Orleans. In addition, the primary investigators attended the Society of Naval Engineers regional meeting in Biloxi, where the project consultant presented a paper. We have had substantial discussions about technology transfer in the shipbuilding industry with multiple participants at each of these visits. The industry participants at these visits have been executives responsible for specifying and funding technology used in the various shipyards.

Milestone 2: During initial literature review, the research team identified an industry structural variable that we thought had the potential to seriously impact the proposed model. Accordingly, we pursued milestones 1&2 concurrently in order to decrease the amount of rework necessary. Initial visits to representative industry firms have been made, and we are in the process of writing the actual structured interviews. Our initial thoughts on the impact that industry structure had on the technology transfer process have been confirmed.

There are at least three primary industry strategic groups that seem to operate with different technology transfer mechanisms and justification schemes. The U.S. shipbuilding industry is divided into shipyards that primarily build or rework ships for the U.S. Navy, larger commercial yards that have the capability to build either commercial or some U.S. Navy ships, and smaller commercial yards that typically do not build large commercial ships or have Navy contracts. There seem to be important differences in the technology justification process and standard practices between these three shipbuilding industry strategic groups, although all seem to have a place in the shipbuilding industry of the future.

Milestone 3: Based on achieving more from the initial site visits than we had anticipated, and following several brainstorming sessions by the research team, we have determined that we have enough data to begin construction of the initial survey questionnaire. We think it would be advantageous to have this initial questionnaire to show to our initial interviewees so that definite feedback can be obtained. Target date for this initial instrument is no later than April 15.

Milestone 4: In keeping with our decision to concurrently proceed with as many milestones as possible, we have obtained a listing of all U.S. and foreign shipyards, as well as more detailed

information about larger shipyards in the U.S. We will determine from this list our target sample for questionnaire mailing.

Milestones 5 - 10: To date, no progress has been made on these areas of the study.

PROPOSED ACTIVITIES NEXT PERIOD:

Plans for Next Quarter

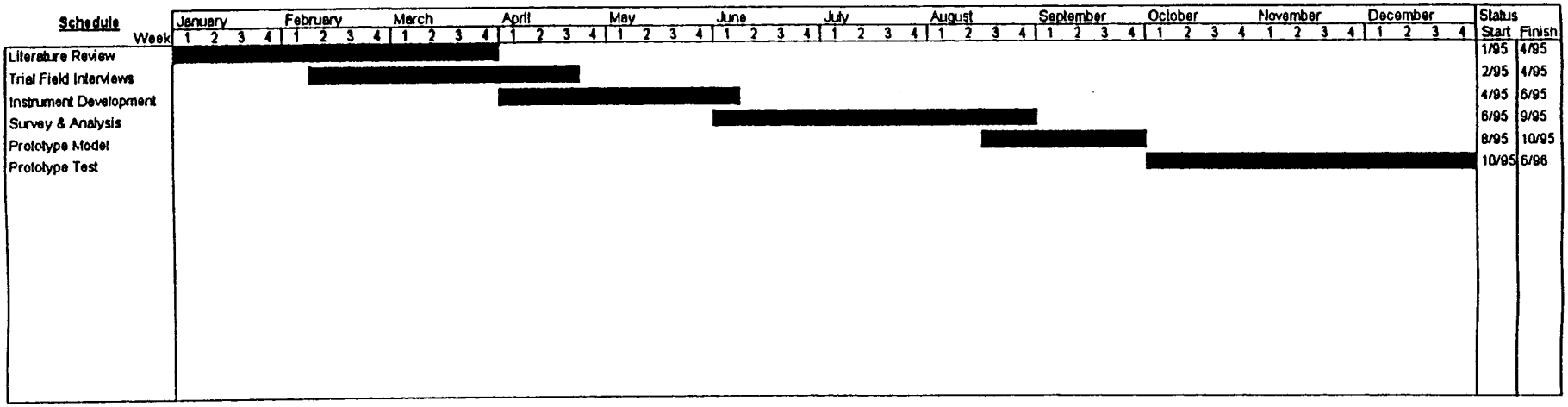
Our plans for the next quarter are to incorporate interview feedback, complete the survey instrument, finalize the sample population, and push toward our initial survey of industry. We will set up our analysis methodology for the survey. These items are substantial parts of milestones 5 & 6 above.

Likelihood of Requiring an Extension of Time or Funds

At the present time, the project appears to be slightly ahead of schedule. However, we will soon move from the stage where events are under the control of the researchers, and into the area where we have to maintain contact with and receive feedback from multiple respondents. Based on the response rate of past researchers that have worked with the shipbuilding industry, we anticipate that we will have to do a large amount of follow-up to assure a representative sample size. We believe that we have anticipated this in our research design.

It should be noted that this project was designed to be a two-year project. If the project is only funded for one year, there is a substantial risk of not achieving the primary purpose of this research. The second year is necessary to work with the industry participants and other GCRMTC researchers to implement the model and make iterative changes that will customize the model to individual strategic groups. The model test stage is designed to work with industry participants as they actually implement technology within a firm. Much will be learned during this second year that will not be obvious in the first year of research. We do not anticipate needing any additional funds, but we do need the time for which the project was designed.

Title IMPROVING TECHNOLOGY TRANSFER IN THE SHIPBUILDING INDUSTRY - PROJECT 30



APPENDIX M

SHIP CAPSIZING (AN ACCURATE AND EFFICIENT TECHNIQUE TO PREDICT SHIP ROLL DAMPING)

GCRMTC PROJECT NO. 36

Principal Investigator: **Jeffrey M. Falzarano**
Department of Naval Architecture and Marine Engineering

Additional Researcher: **Richard A. Korpus**
Senior Research Scientist, Marine Hydrodynamics (SAIC, Ship Technology)

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: This project will develop an accurate and efficient technique to predict ship roll damping using the Finite Analytic Reynolds Averaged Navier Stokes (FA-RANS) solution technique. This capability will be used to improve naval and commercial hull form design with regards to minimizing the most critical resonant roll motions and loads. The approach to be utilized will be to apply progressively more accurate yet computer intensive approximations. Comparisons will be made with existing and to be obtained model and full scale data. Extensive use will be made of existing SAIC capability and UNO experimental and computer resources including the new Cray.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 222,296
FUNDS REMAINING	$ 181,875

ACCOMPLISHMENTS THIS PERIOD:

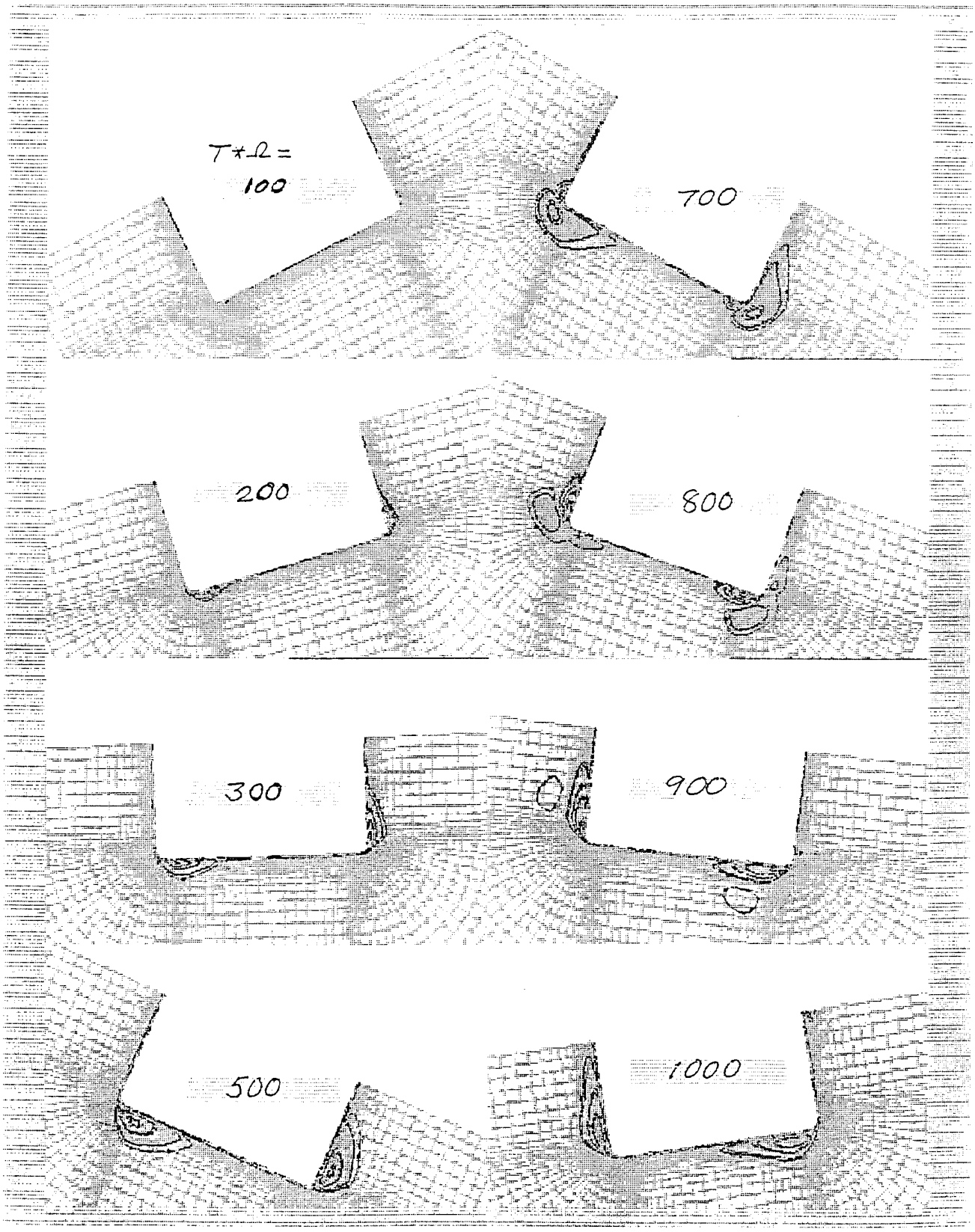
1) Completed SAIC sub-contract and they began work (February 1).

2) Purchased and Installed SG Power Indigo II ($37,500), since installed 128MB additional RAM

3) Began work on development and analysis tasks with Dr. Korpus(SAIC). These are: During the two weeks of February 20 thru March 3, Dr. Korpus visited the University of New Orleans. Along with helping us set-up loaner SG Indigo II, and the new Silicon graphics Indigo II, Dr. Korpus was able to develop the analysis software and grid generation program for the 2-D without a free-surface case. Using computer time he had available on the NASA Ames CRAY C-90 (12 hours=$4800), he was able to run a Laminar flow case while here at UNO and a turbulent flow case upon his return to SAIC Annapolis. He has since fowarded the results to both cases in the form of movies and a series of plots of time histories and a Fourier analysis of the forces and moments.

PROPOSED ACTIVITIES NEXT PERIOD:

For the 2-D without a free-surface case, we will produce a wall-sided with bilge radius systematic series. The following six parameters will be varied: 1) Beam/Draft, 2) bilge radius/Draft, 3) motion frequency, 4) roll center (roll and sway), 5) bilge keel size, and 6) motion amplitude. In order to enable the UNO site to run these cases, another visit will be required by SAIC personnel to set-up appropriate software. We believe, the results of this systematic series will be usable by practicing engineers, so that he/she will be able to quantify the effect of these design parameters on damping.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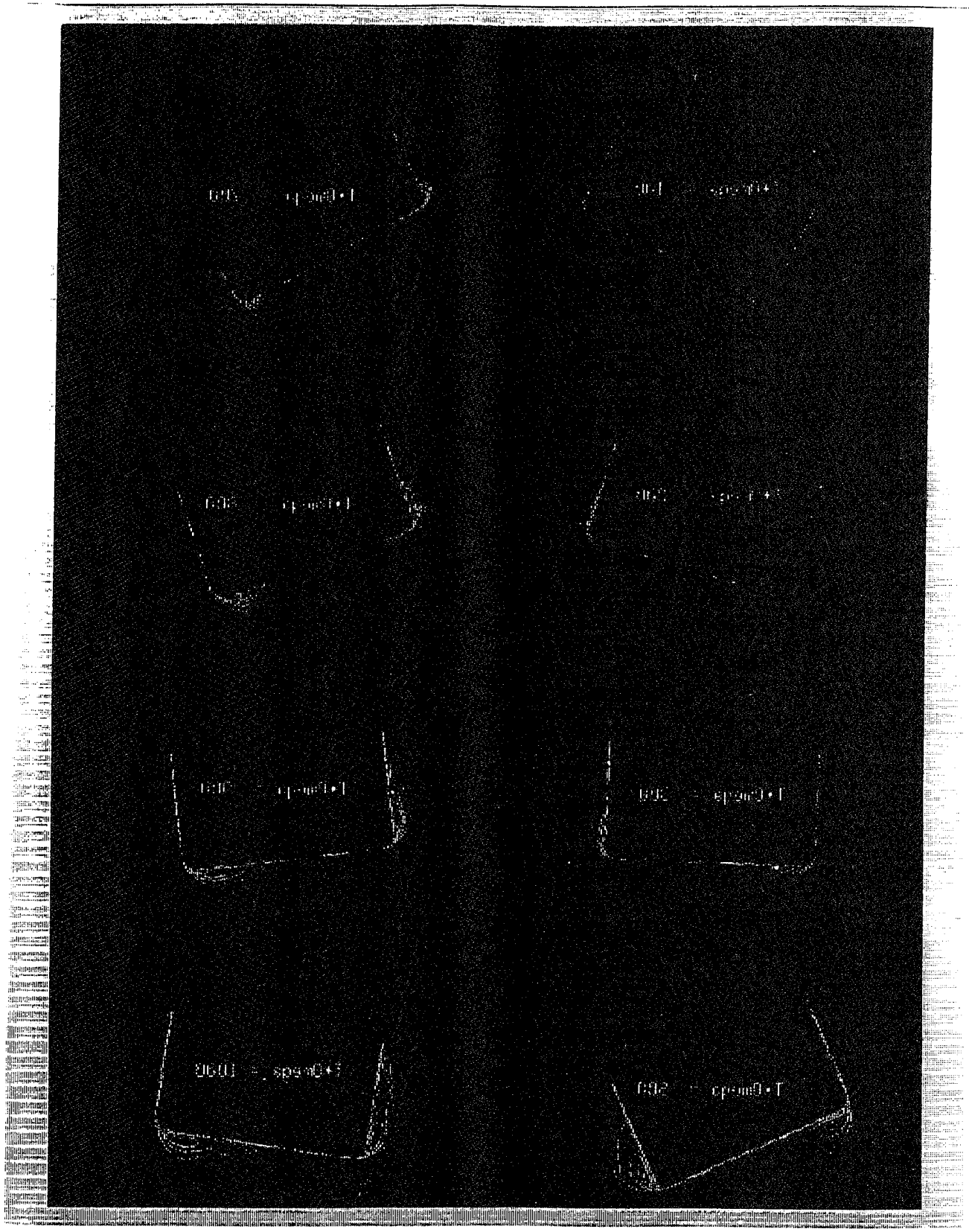
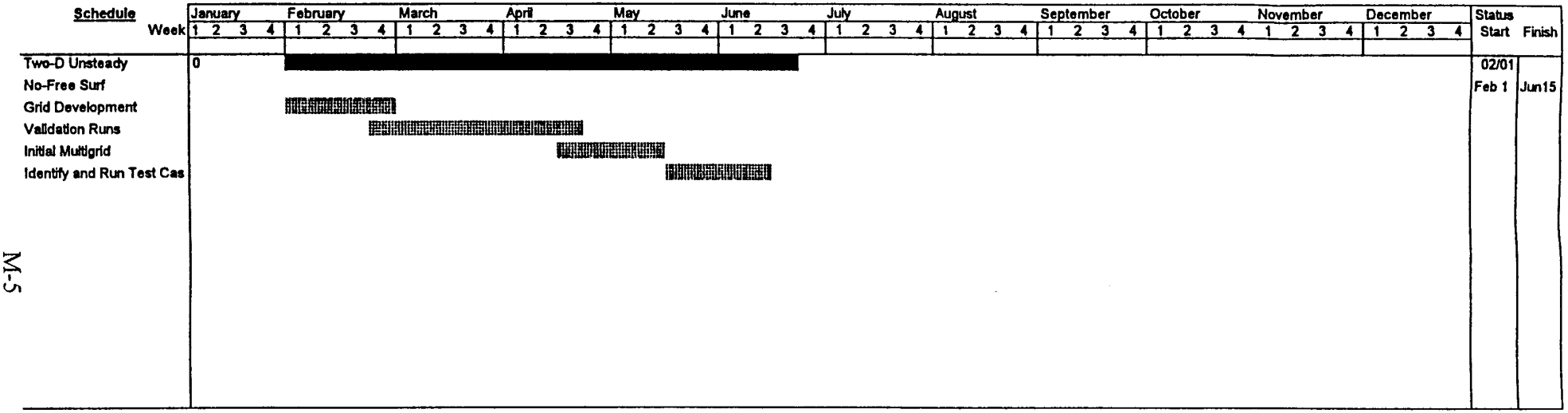


Ship Capizing (An Accurate and Efficient Technique to Predict Ship Roll Damping)



APPENDIX N

MOTION SICKNESS AND ANTI-MOTION SICKNESS TREATMENT

GCRMTC PROJECT NO. (NOT ASSIGNED)

Principal Investigator: **Thomas G. Dobie**
Department of Psychology

Additional Researcher: **James G. May**
Department of Psychology

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: Develop and Validate Training Program and Report on the Relationship Between Motion Sickness and Personality; Accomplish Technology Transfer of Motion Sickness Program.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$ 100,000
FUNDS REMIANING	$ 100,000

ACCOMPLISHMENTS THIS PERIOD:

Starting Date of the Project: The project was not able to start officially on October 1, 1994, for two reasons. First, the contract was not received until February 7, 1995 and, second, Dr. Dobie is waiting for an interview at the United States Embassy in London, in order to receive his work visa. However, as you will see from the following report, a start has already been made in order to minimize time delays after receipt of the visa.

Significant Milestones Achieved Since the Start of the Project:

Task #1: Develop Training Program for CBMT Trainers:

a) A draft proposal has already been prepared for a course of training for CBMT Trainers and submitted to NBDL for their review;

b) A "Handbook of Cognitive-Behavioral Training", for use by trainers is in preparation, and is 80% completed;

c) Plans have been drawn up to evaluate the new mechanical training device prior to its transfer to a fleet location to carry out field validation of cognitive-behavioral anti-motion sickness training (see Task #2)

Task #2: Assist in Technology Transfer of the CBMT Program:

a) NBDL, through CDR Dolgin, is in communication with the LCAC force on the East Coast as a proposed site for field validation trials. Phase 1 of that task will be an assessment of the sensitivity of local volunteers from LCAC crews to provocative motion on the new mobile rotating/tilting chair; this screening study will also include a motion sickness questionnaire survey.

Task #3: Assist in Construction of a Selection Tool on Motion Sickness:

We are reviewing the problems found in NBDL validation studies on the SMS with the Human Factors Group at NBDL. The review of literature on this matter continues and we will remain in touch with European and American psychologists in this field. As far as an evoked potential index of motion sickness is concerned, we are standing by to review any results forwarded by NBDL.

Task #4: Personality:

This project has just started in the form of a literature survey to obtain existing information on the relationship between motion sickness and personality profiles prior to carrying out investigative trials. We anticipate selection of a putative battery by June 1, 1995.

Problems Encountered and Solutions Obtained:

The delay in receiving the funds and in Dr. Dobie's arrival have provided some hardships, but a considerable start-up effort has been accomplished. Much of what has been proposed depends on input and initiatives from NBDL, and the future closure of that facility may cause us to reorganize of efforts.

PROPOSED ACTIVITIES NEXT PERIOD:

Projected Milestones Beyond the Next Quarter:

We hope to be in position at a remote site (e.g. the east coast LCAC site) to begin data collection and field testing of the Cognitive-behavioral technique by the beginning of the third quarter. By then, we hope to have selected the battery of personality tests to be used in evaluating the relationship between those variables and motion sickness susceptibility.

Detailed Plans for the Next Quarter:

We will train 5 counselors in the use of Cognitive-behavioral treatment and the use of the rotating/tilting chair. We will also complete the handbook on Cognitive-behavioral counseling. We will complete the literature review on motion sickness and screen putative personality tests for test-retest reliability.

Likelihood of Requiring an Extension of Time for the First Year:

In light of the late start and the uncertainties regarding NBDL, it is quite likely that we may need to request a no-cost extension to complete the project.

Motion Sickness and Anti-Motion Sickness Treatment

Schedule	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Status
Week	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	S/F
Task 1													2/95 7/95
Task 2													7/95 12/95
Task 3													3/95 11/95
Task 4													4/95 11/95

Task #1: Develop Training Program for CBMT Trainers
Task #2: Assist in Technology Transfer of the CBMT Program
Task #3: Assist in Construction of a Selection Tool on Motion Sickness
Task #4: Personality